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ABSTRACT

This illustrated teacher's guide provides background and activities for helping youths aged 12 and older to understand basic wildlife biology and ecology. The first of the guide's five chapters is an introduction explaining the purpose and format of the guide, addressing safety and responsibility issues, and defining several terms and concepts used throughout the text. Chapter 2, "Wildlife Survival and Needs," and chapter 3, "Wildlife Habitats," cover important concepts about wildlife biology and ecology. Chapter 4, "Backyard Wildlife: What You Can Do," and chapter 5, "Rare Wildlife Species: What You Can Do," outline some actions that can be taken to benefit the wildlife found in human communities. Discussion questions, illustrations, and activities are provided in each chapter to help convey the material. Reproducible record sheets for the activities are included in the pocket folder, along with a list of endangered and threatened species and species of special concern for New York State. The teacher's guide contains a glossary of terms. Appended are: (1) information on wildlife habitat improvement programs; (2) a list of organizations that aid threatened and endangered species; and (3) references for further reading and references used in preparing the guide. (KS)

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4-H NATURAL RESOURCES

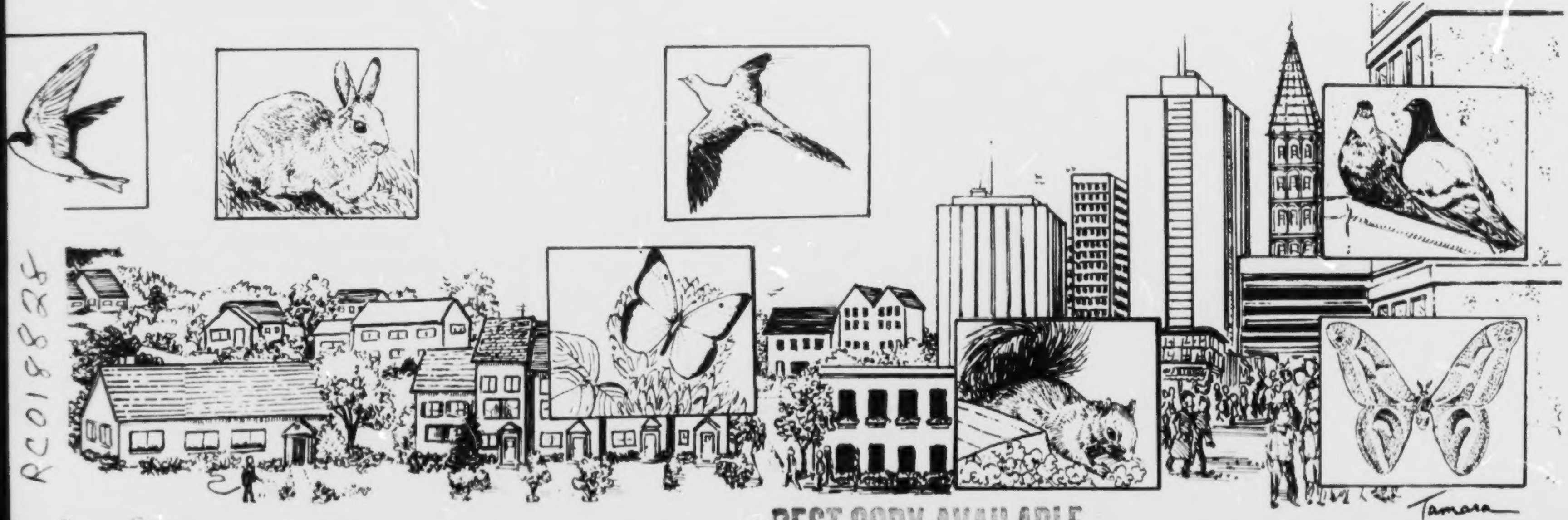
Wildlife in Today's Landscapes

Marianne E. Krasny

Leader's/Teacher's Guide

L-5-20

A Cornell Cooperative Extension Publication



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Cornell Cooperative Extension

Helping You Put Knowledge to Work

Marianne E. Krasny is an assistant professor of forest science, Department of Natural Resources, Cornell University, and New York State program leader, 4-H Natural Resources.

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1 Introduction

Although most of the land in New York State is forest or farmland, a majority of the people in the state live in or near a city. In fact, 65 percent of the population of New York—or about 11,000,000 people—live in large urban centers. An additional 20 percent live in smaller urban communities.

The opportunities to interact with wildlife in urban and suburban environments are very different from those in rural areas. This is because urban environments support different types of wildlife than their less developed surroundings. For a few species of wildlife, urbanization has improved conditions, resulting in increased populations. For most species, however, urbanization has resulted in a decrease of suitable habitats and, therefore, a decline in numbers. In some areas, humans are working to reverse the negative impact of urban development on wildlife and to reintroduce wildlife that have been lost.

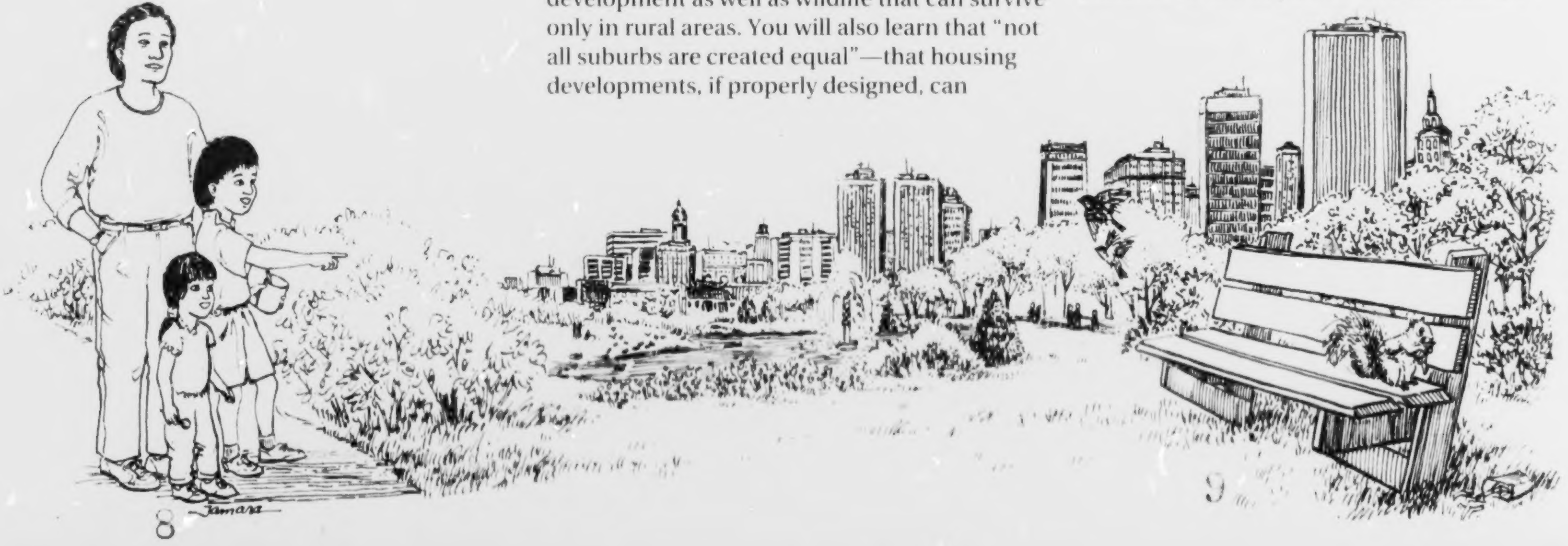
Many people who live in urban and suburban environments enjoy wildlife. Observing wildlife in their neighborhoods provides them and their families with hours of enjoyment and unique opportunities to learn about the natural world. They also like to know that some areas are being protected from development and set aside for wildlife. They may even wonder what they can do to benefit wildlife, both in their backyards and in wildlife preserves.

To help wildlife in your neighborhood and throughout your state, you must first understand something about wildlife biology and ecology. In the following pages, you will explore the biology and ecology of wildlife in urban, suburban, and rural environments. You will learn about wildlife that benefit from urban development as well as wildlife that can survive only in rural areas. You will also learn that "not all suburbs are created equal"—that housing developments, if properly designed, can provide suitable habitats for many species of wildlife. Finally, you will explore what you can do to increase the diversity of wildlife in your neighborhood and in your state.

One of the best ways to ensure a future for all wildlife is to help children develop a sense of caring about wildlife. This publication not only will provide you, as a parent, adult leader, or teacher, with information about what you can do for wildlife, but also will make suggestions about how you can involve youths in your family, 4-H or scout club, camp, or classroom in wildlife projects.

Purpose and Format

The purpose of this publication is threefold: (1) to introduce some of the principles of wildlife biology and ecology and explain the latest research on the impact of urbanization on



wildlife; (2) to suggest actions you can take that will benefit wildlife in urban and suburban communities and parks and preserves; and (3) to guide you in teaching youths the concepts you have learned.

The material presented is most appropriate for youths aged twelve and older who have some background in the study of wildlife. For younger youths, *Wildlife Discovery*, a beginning-level 4-H publication, may be more appropriate (see Appendix III).

Following this introduction (chapter 1), you will find four additional chapters in this guide. Chapter 2, Wildlife Survival and Needs, and chapter 3, Wildlife Habitats, cover important concepts about wildlife biology and ecology. Chapter 4, Backyard Wildlife: What You Can Do, and chapter 5, Rare Wildlife Species: What You Can Do, outline some actions that you and the youths in your group can do to benefit wildlife. Discussion questions and illustrations are included to help you convey the material to youths. In addition, there are one or more activities in each chapter to help youths understand the information. Record sheets for the activities are included in the pocket folder and can be photocopied for the members of your group.

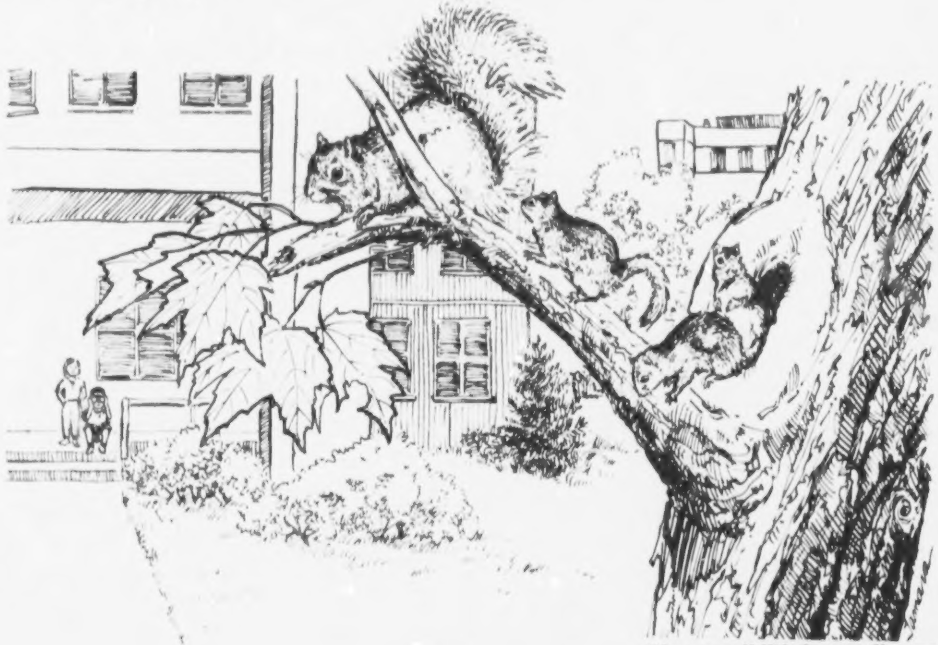
The three appendices to this publication provide supplementary information, including a list of several organizations that are engaged in activities that benefit urban wildlife (Appendix I), a list of agencies and organizations working to aid rare and endangered species (Appendix II), and a list of field guides, magazine articles, and other publications that can help you and your group learn more about wildlife (Appendix III). A table of plants and the wildlife species they attract and a list of endangered and threatened species are included with the activity record sheets in the pocket folder.

Additional Resources

Two videos may help you understand and teach the concepts in this publication. First, *Wildlife in Your Own Backyard*, a video produced by the National Wildlife Federation, will familiarize you and your youth group with the basic needs of wildlife. The video *Wildlife in Cities and Suburbs* is available from the Department of Natural Resources 4-H program at Cornell University. It takes you on a tour of New York wildlife habitats, from the eastern tip of Long Island, an area where open space is still to be found, through the suburban developments of middle Long Island, to New York City, our country's most densely populated urban environment. (Here, *densely populated* refers to human populations. Read on—you will discover that New York City also has dense populations of some wildlife species.)

Safety and Responsibility

Some of the activities described in this publication take place outdoors. Whenever possible, have two youths work together. Better yet, have the youths involve their parents or other adults in the activities. Make sure the youths let someone know where they are going and when they plan to return.



Observe wildlife from a distance.

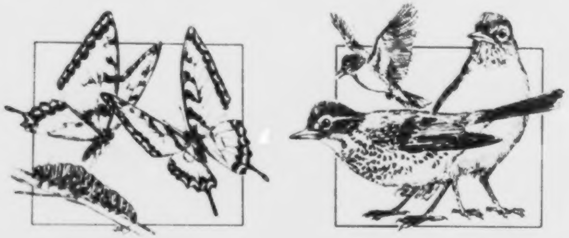
In some areas, poisonous plants such as poison ivy or biting insects and ticks may be a problem. If you have any questions about taking precautions to avoid these hazards, contact your local Cornell Cooperative Extension office or the Department of Environmental Conservation.

In the activities that involve observing wildlife, it is important not to disturb the animals. Causing animals to temporarily leave their nests even for short periods may interfere with their attempts to reproduce and raise their young. Remind the youths in your group not to make loud noises or move quickly and to keep a reasonable distance between themselves and any wildlife. When observing wildlife up close, groups should be limited to two or three persons.

Understanding Wildlife Ecology

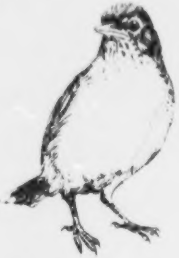
To get the most out of this guide, you should become familiar with several terms and concepts referred to throughout the text. Refer also to the Glossary on page 58.

A **species** is a group of animals or plants that resemble each other and breed among themselves. Humans, American robins, raccoons, and swallowtail butterflies are examples of different species.

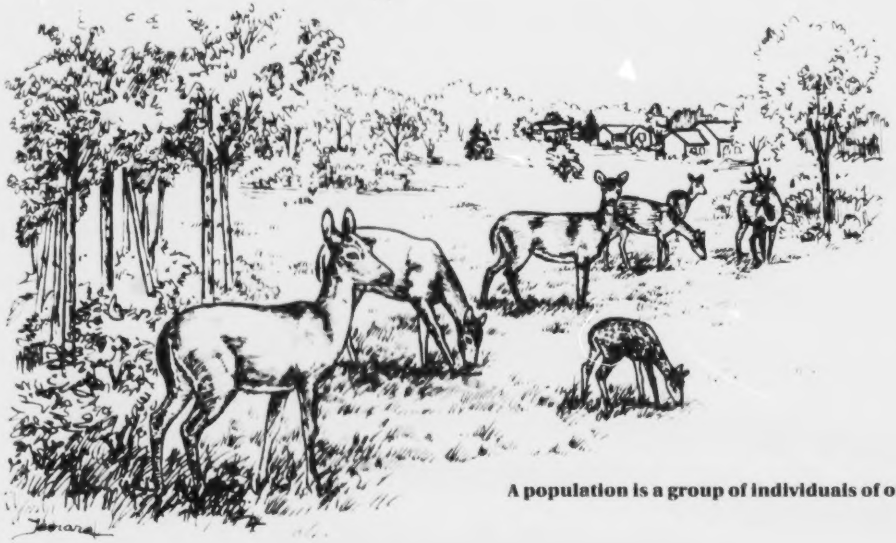


Swallowtail butterflies and American robins are examples of two different species.

An **individual** is one member of a species. You are an individual just as a single robin is an individual. A **population** is a group of individuals of one species.



An individual is one member of a species.



A population is a group of individuals of one species.

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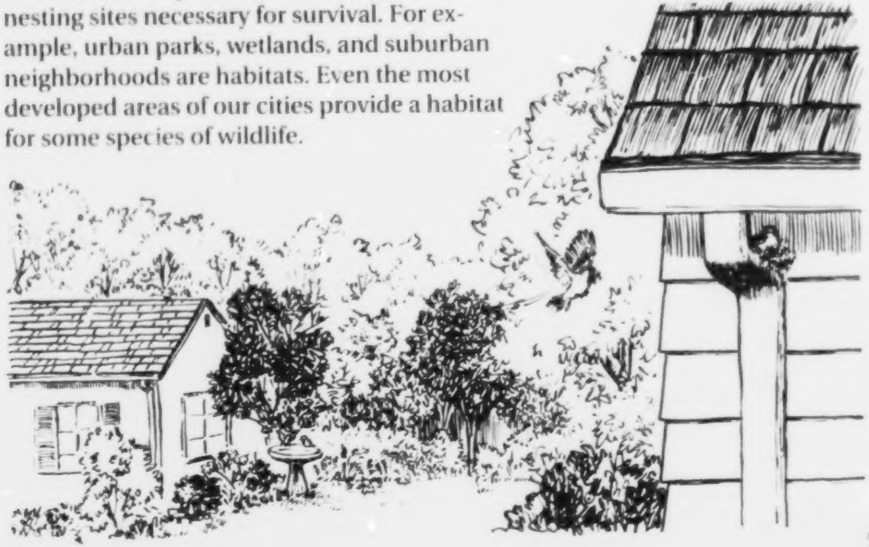
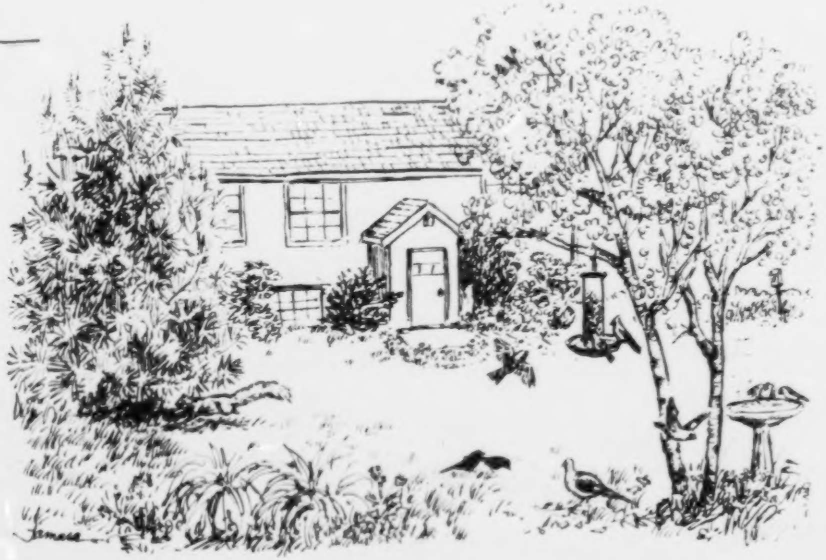
A **habitat** is the physical and biological environment in which an individual plant or animal lives. The habitats of wildlife consist of the plants, ponds, and buildings (or other structures) that provide the food, water, and nesting sites necessary for survival. For example, urban parks, wetlands, and suburban neighborhoods are habitats. Even the most developed areas of our cities provide a habitat for some species of wildlife.



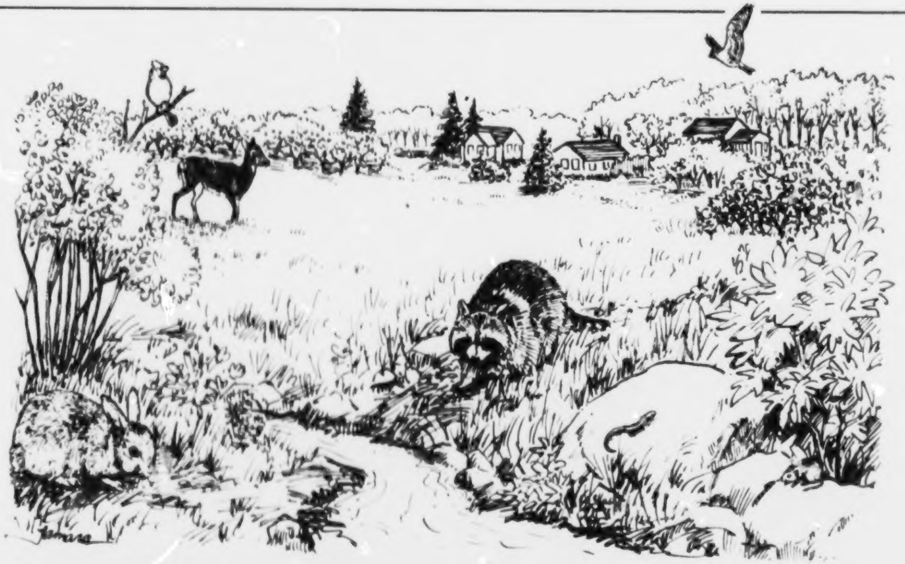
House sparrow habitat

Wildlife diversity, or **species diversity,** refers to the number of different species of animals within a particular habitat. Diversity is also used in this guide in a more general sense to mean variety. For example, there may be a diversity (variety) of wildlife habitats, such as farms, woodlots, and urban areas, within a particular region. Or within one habitat, such as a forest or suburban lawn, there may or may not be a diversity (variety) of plant species, layers of vegetation (such as trees, shrubs, and ground plants), and nesting sites for animals.

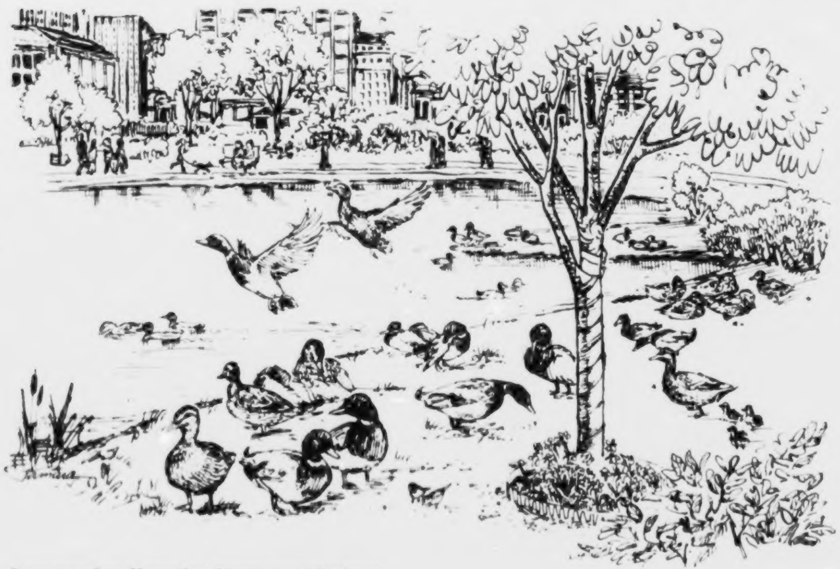


Species diversity

It is important to distinguish between species diversity, the number of different species, and population size, the number of individuals of any one species. Some habitats have many different species (high species diversity) but very few individuals of any one species (small populations). Other habitats have very few species (low species diversity) but many individuals within each species (large populations).



High species diversity, small populations



Low species diversity, large populations

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Can you predict which habitats will have high or low species diversity? Which habitats will have large or small populations?

Read on, and discover the answer to these and many other questions about wildlife in today's landscapes.

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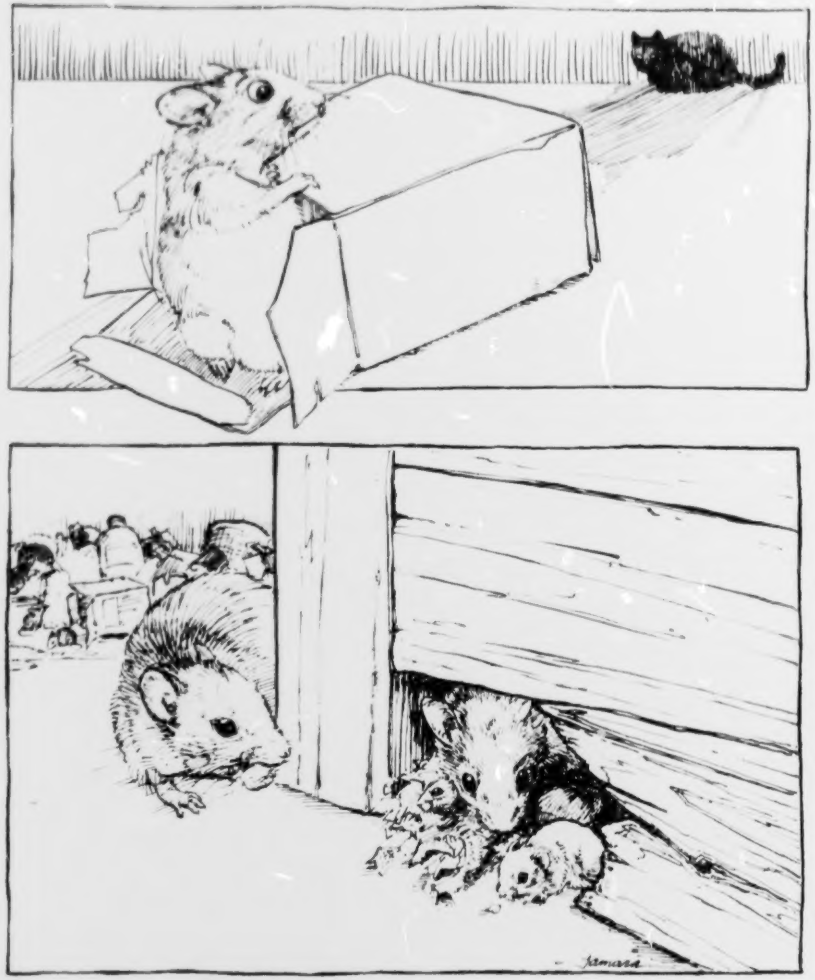
2 Wildlife Survival and Needs

For a pigeon, a house mouse, or any other *individual* animal to survive, it must be able to get enough food and water to grow and carry on its life processes. An individual that is not able to find adequate food and water will die. For an animal *species* to survive, enough individuals of that species must reproduce to replace individuals that die. If too few young are produced, the species will become extinct. Wildlife generally build or use some type of nest in which to breed, reproduce, and raise their young. Food, water, and nesting sites, therefore, are the basic needs of all wildlife.

Discussion Questions

- What does an individual need to survive?
- What does a species need to survive?



Along with food and water, wildlife need protected nesting sites in which to raise their young.

There are two activities at the end of this chapter.

Activity 2-1: Wildlife Guilds takes place indoors and reinforces the concepts introduced in this chapter.

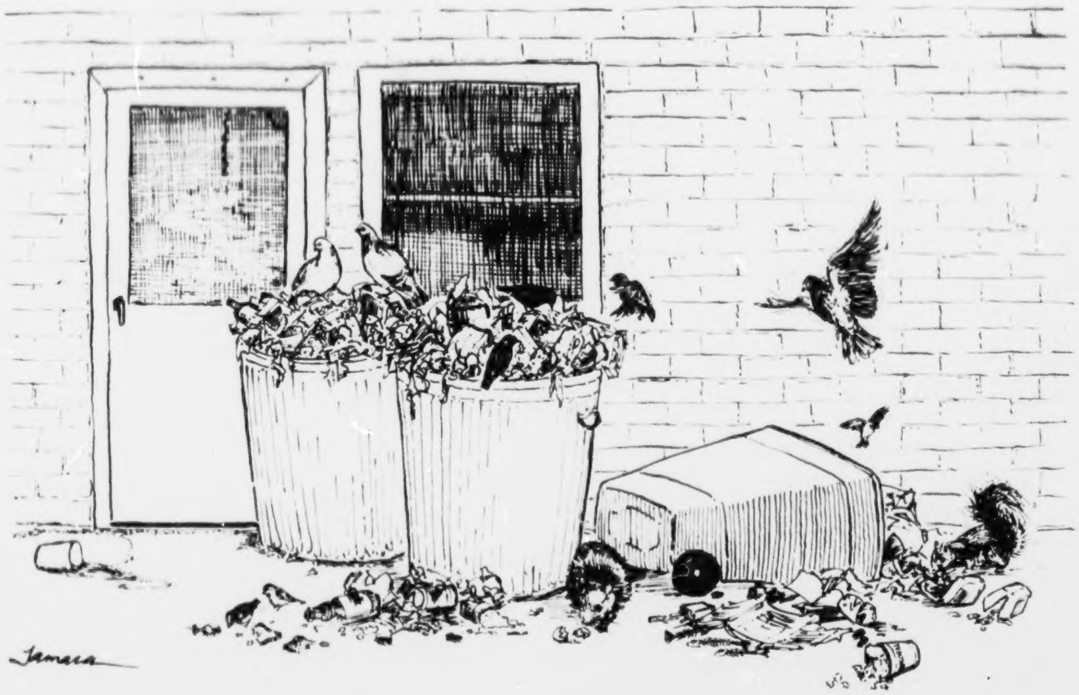
Activity 2-2: Neighborhood Survey is an outdoor exercise designed to help youths discover what foods, water sources, and nesting sites are available for wildlife in different habitats in their community.

Food

In urban and suburban environments, food sources for many kinds of wildlife are becoming increasingly scarce. A concrete parking lot or a well-manicured lawn offers little in the way of nuts, fruits, and insects for birds and small animals. The absence of food that attracts small animals makes finding enough food difficult for large birds and mammals such as hawks and lynxes, which depend on small animals for nourishment.

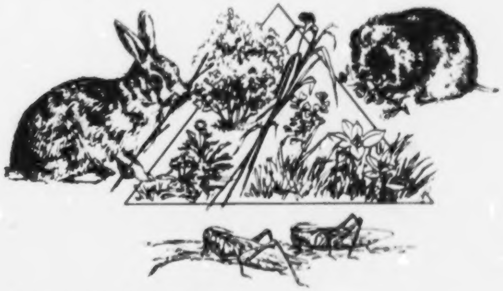
On the other hand, urbanization results in a variety of new foods for wildlife (and humans!). The fast-food restaurant may be a great way for parents to feed children at the end of a busy day. At the same time, french fries discarded in an open dumpster can be a windfall for a mother house sparrow, gull, or American crow trying to feed her young.

The kinds of food available for wildlife determine, in part, which animals can live in a particular habitat. Biologists have given names to groups of animals that eat similar foods. Some examples of these groups are illustrated on the next two pages.



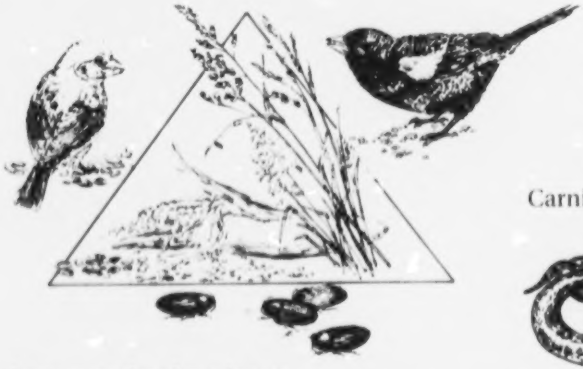
Some wildlife take advantage of foods that are present where people live.

Herbivores eat plants.



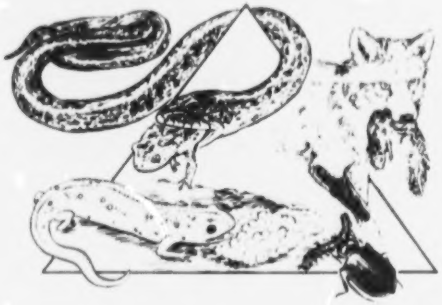
Some examples of herbivores:
eastern cottontail, meadow vole, and grasshopper.

Granivores eat seeds or grains.



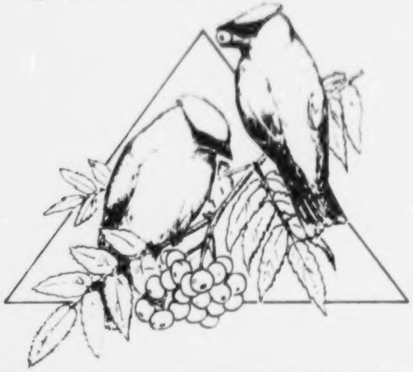
Some examples of granivores:
house finch, redwing blackbird, and flour beetles.

Carnivores eat other animals.



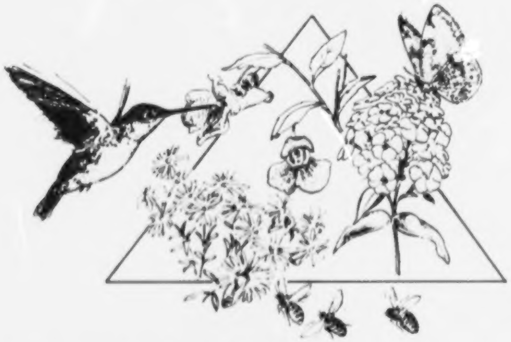
Some examples of carnivores:
eastern garter snake, red fox, ground beetle, and red-spotted newt.

Frugivores eat fruit.



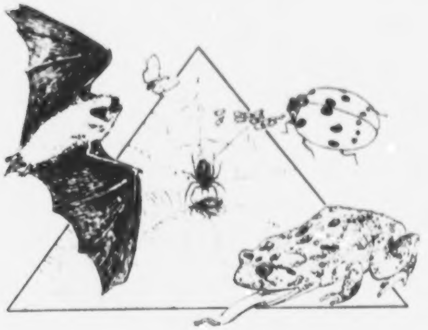
Cedar waxwings eat the berries of an American mountain ash.

Nectarivores eat the nectar of flowers.



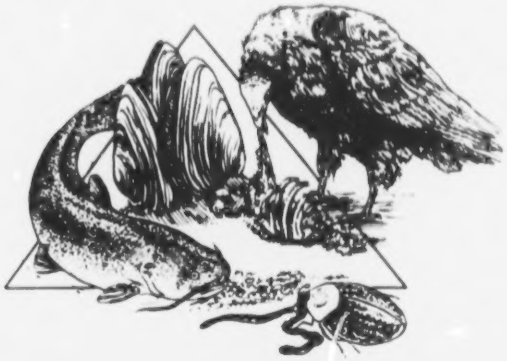
Some examples of nectarivores:
ruby-throated hummingbird, pearl crescent butterfly, and honey bees.

Insectivores eat insects.



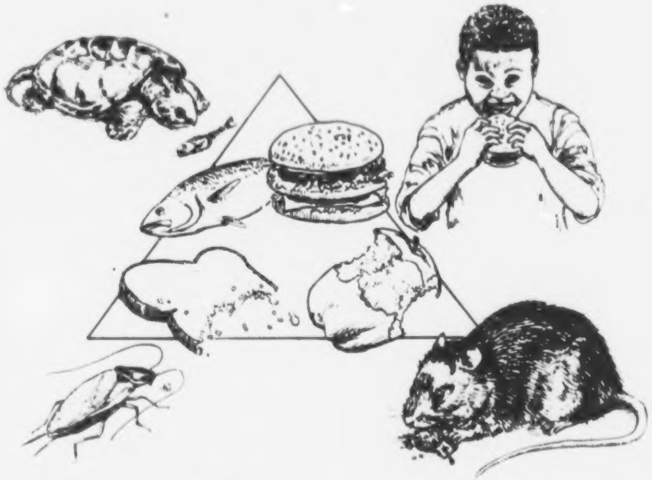
Some examples of insectivores:
little brown bat, spider, ladybird beetle, and American toad.

Detritivores, or scavengers, eat dead and decaying plants and animals.



Some examples of detritivores:
catfish, clams, turkey vulture, and carrion beetle.

Omnivores eat several types of food. Some even eat garbage.



Some examples of omnivores:
snapping turtle, human, Norway rat, and German cockroach.

Discussion Questions

- What foods are available for wildlife in your school yard? In your neighborhood?
- What food-eating groups would you expect in your school yard or neighborhood?

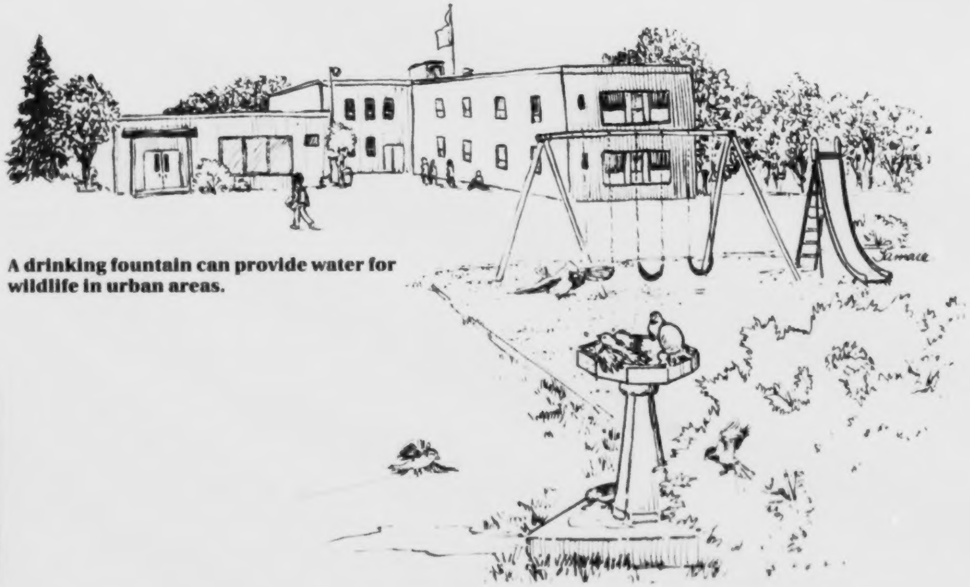
Water

Wildlife obtain water in various ways. Some wildlife need open water such as ponds and creeks. Others lick dew from leaves or obtain water through the foods they eat. Some urban inhabitants, like the house mouse, are particularly efficient at conserving water and can survive on very small amounts.

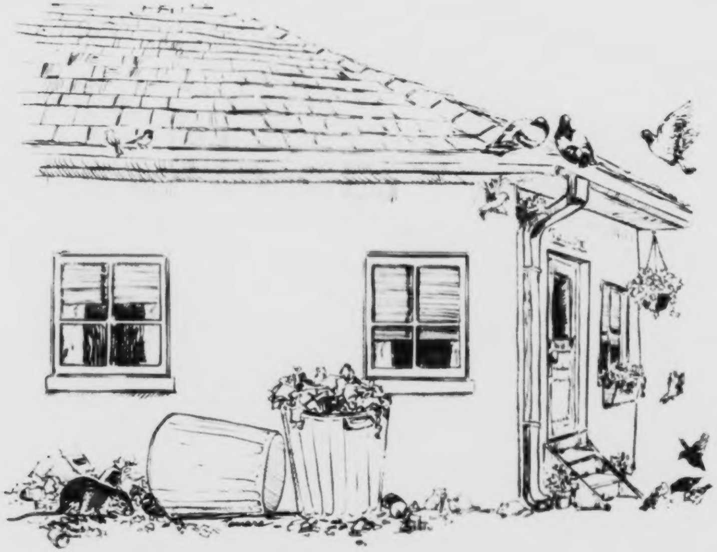
In urban environments, one can walk for blocks and blocks without seeing a stream or other source of water. This lack of water may limit the number of animals that live there.

Discussion Question

- **Where would animals find water in your school yard? In your neighborhood?**



A drinking fountain can provide water for wildlife in urban areas.



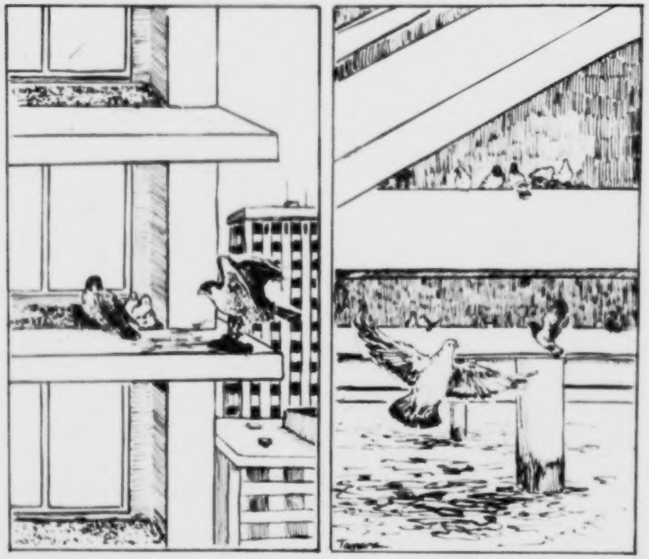
Nesting Sites

Many wildlife species need protected sites for breeding, reproducing, and raising their young. These sites must provide shelter from predators and the elements. A well-manicured lawn, which provides little food, also offers little protection from predators such as cats or shelter from storms. On the other hand, the house or apartment building that gives people shelter may also provide nesting sites for several species of wildlife.

Just as biologists have given names to animals that eat similar foods, so have they given names to groups of animals that nest in similar sites.

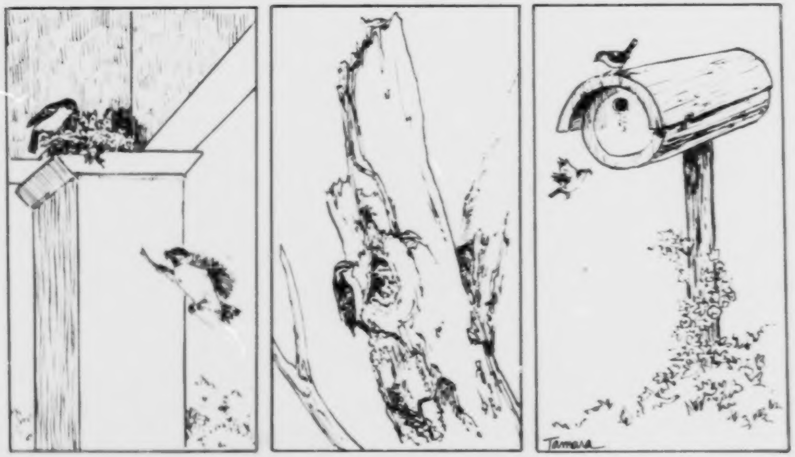
A house can provide nesting sites for several species of wildlife.

Cliff nesters, in urban areas, build nests on apartment buildings and bridges.



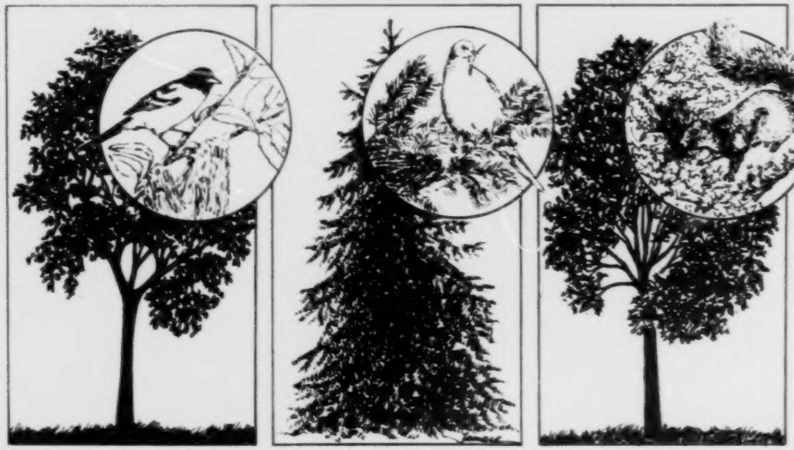
Some examples of cliff nesters: peregrine falcons and pigeons.

Cavity nesters live in the cavities of trees as well as in bird houses and, like cliff nesters, in nooks and crannies in buildings.



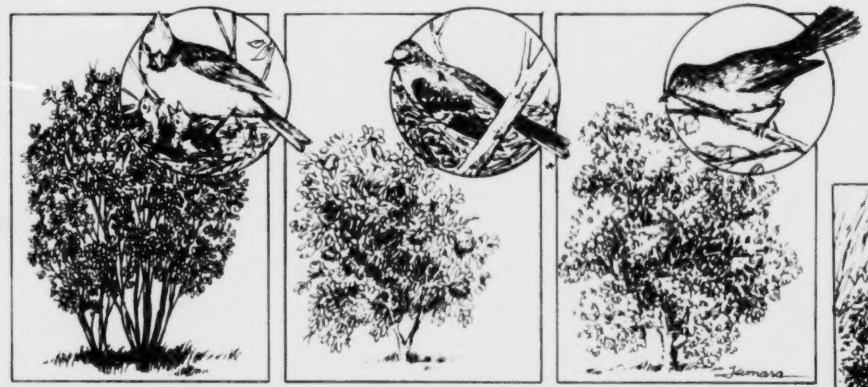
Some examples of cavity nesters: house sparrows, downy woodpecker, and house wrens.

Tree nesters build their nests on the twigs and branches of trees.



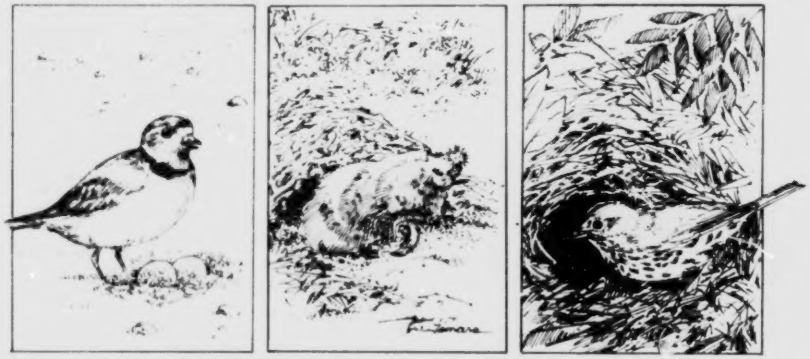
Some examples of tree nesters: northern oriole, mourning dove, and gray squirrel.

Shrub nesters build their nests in bushes.



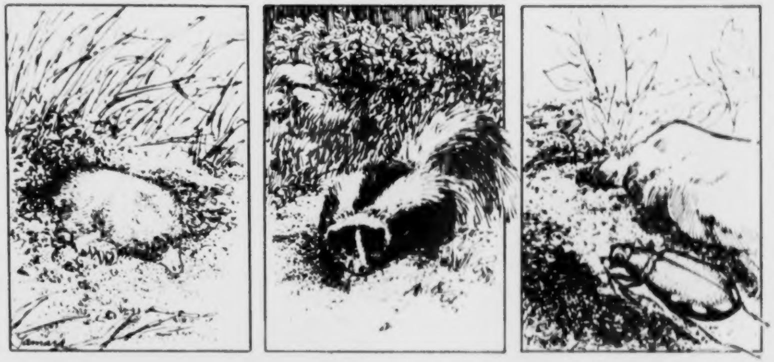
**Some examples of shrub nesters:
cardinal, mockingbird, and gray catbird.**

Ground nesters build their nests on the ground.



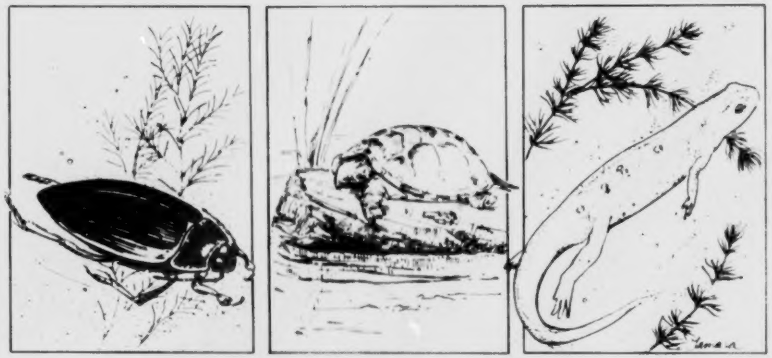
**Some examples of ground nesters:
piping plover, star-nosed mole, and ovenbird.**

Burrowing animals nest underground.



**Some examples of burrowing animals:
eastern mole, striped skunk, and tiger beetle.**

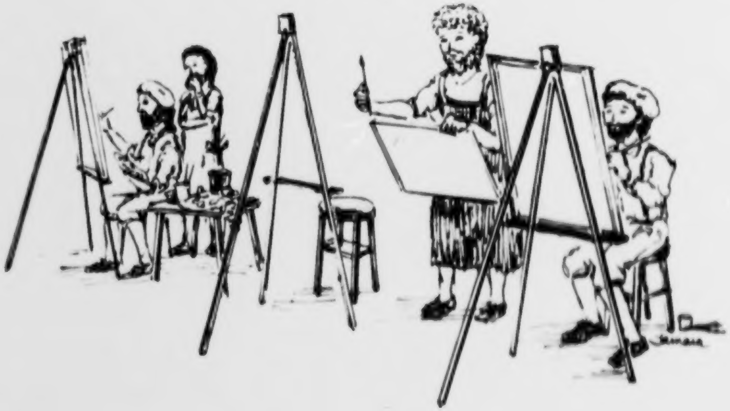
Aquatic animals have homes in the water.



**Some examples of aquatic animals:
diving beetle, snapping turtle, and red-spotted newt.**

Discussion Questions

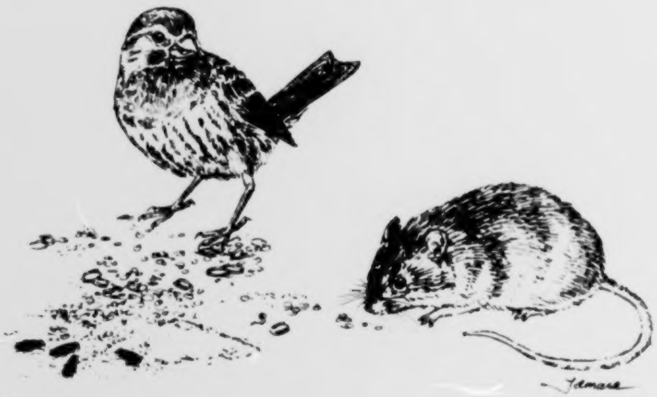
- Where would wildlife find nesting sites in your school yard? In your neighborhood?
- What nesting groups would you expect to find in your school yard or neighborhood?



Medieval art guild

Wildlife Guilds

In medieval times, people who had the same occupations formed associations called guilds. Merchants and traders, for example, each formed their own guilds. Today, biologists use the term guild to describe groups of animals that use similar resources, such as the food and nesting groups illustrated on the previous pages. For example, biologists use the term granivore guild to describe the group of animals that feed on grains and the term cliff-nesting guild to describe the animals that nest on cliffs or cliff-like structures.



Members of the granivore guild:
house finch, flour beetles, and house mouse.

Activity 2-1: Wildlife Guilds

This activity reinforces the concept of feeding and nesting guilds. In your pocket folder are pages of cards illustrating animals from different nesting (N) and feeding (F) guilds. You will need to photocopy the Wildlife Guilds Activity Cards and cut out the cards.

Hand out the cards marked "F" to the youths in your group. Ask the youths to place the animals that eat similar foods into groups. Ask them to name the groups and write down the names.

Then hand out the cards marked "N." Ask the youths to put the animals that use similar nesting sites into groups. Ask them to name the groups and write down the names.

Have one person write down the names of the groups where everyone can see them. Next, discuss the different feeding and nesting groups with the youths. Tell the youths the names that biologists use for different feeding and nesting groups. Define the term guild, and explain how knowing the way different guilds use food sources and nesting sites is important for preserving wildlife. (Hint: For wildlife to survive, the food and nesting sites they require must be present.)

Activity 2-2: Neighborhood Survey

By performing this activity, youths will discover the variety of foods, water sources, and nesting sites in the different habitats in their neighborhoods. This activity is performed outdoors.

Have the youths in your group divide into neighborhood survey teams. Ask each team to choose and assess one or more local habitats. Possible habitats include three city blocks, a school yard, a vacant lot, or a local park. They may even choose the inside of a building such as a home or school, keeping in mind the needs of pest species such as house mice or silverfish. Ask each team to survey the available foods, water sources, and nesting sites in their chosen habitat. Have each member complete the Neighborhood Survey Activity Record.

After the youths have completed their neighborhood surveys, ask them the following questions:

- What wildlife or signs of wildlife did you see in your neighborhood?
- What do you think the wildlife are eating?
- Where do the wildlife get water?
- How do wildlife find shelter from predators and storms?
- What domestic animals that might prey on wildlife are present in your neighborhood?

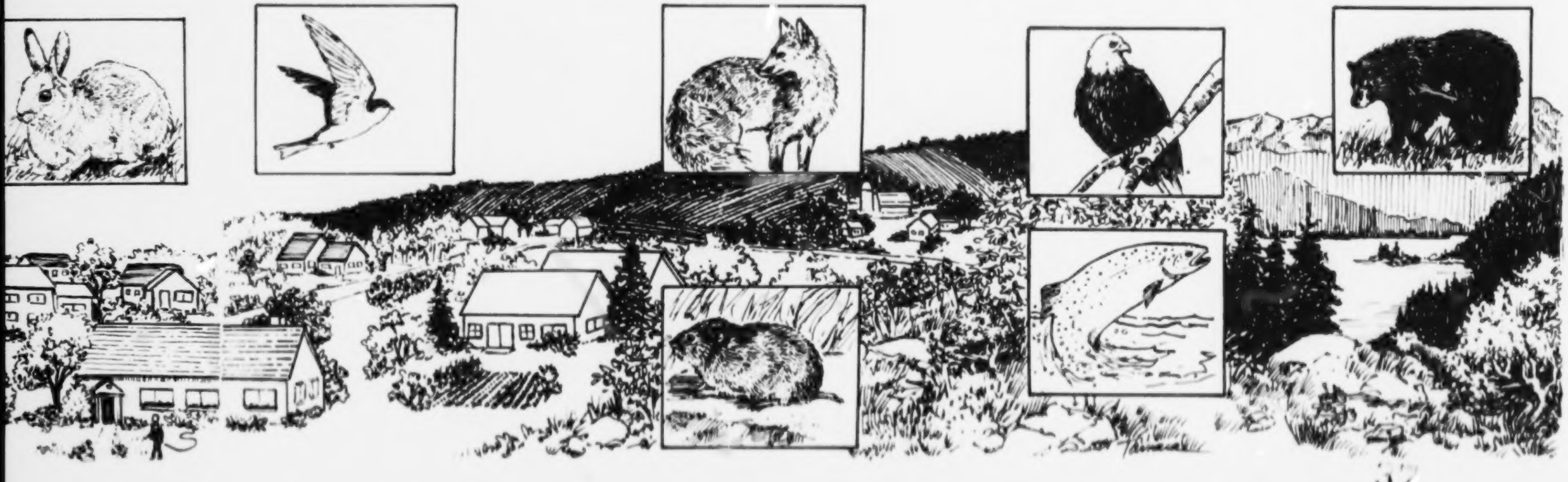
3 Wildlife Habitats

A habitat is the immediate physical and biological environment in which an animal lives. It includes the trees, shrubs, ground plants, ponds, rivers, and buildings that provide the food, water, and nesting sites necessary for wildlife to survive. For a particular species of wildlife to exist, an appropriate habitat must be present.

Today's landscapes in New York State can be divided into six general wildlife habitats, which differ in the foods, water sources, and nesting sites available. Four of these habitats range from very urban to rural: (1) downtown metropolitan areas, (2) the suburbs, (3) the suburban-rural interface, which includes small farms, woodlots, and forest edges, and (4) large wilderness parks and forests.

The fifth habitat is small parks, preserves, and wildlife refuges. Here, some interesting efforts are under way to restore damaged habitats and their wildlife species.

The sixth type of habitat, that of threatened and endangered species, can be found in both urban and rural areas.



Urban, suburban, edge, and forest habitats with associated wildlife

Let's explore these six different habitats and some of the wildlife found in them. It is interesting to note that some wildlife, such as the gray squirrel and the American robin, are found throughout a range of habitats, whereas others are associated with only one habitat. Species that are threatened or endangered often have very specific habitat requirements.

In general, habitats with a variety of foods, sources of water, and nesting sites provide homes for many wildlife species. As this chapter examines each of the six habitats, consider what food, water, and nesting resources are present. Try to predict which habitats will have a large number of different species of wildlife (diversity).

Five activities are included at the end of this chapter.

In **Activity 3-1: Wildlife Pests**, youths explore possible habitats for house mice, silverfish, and other pest species in their home or school.

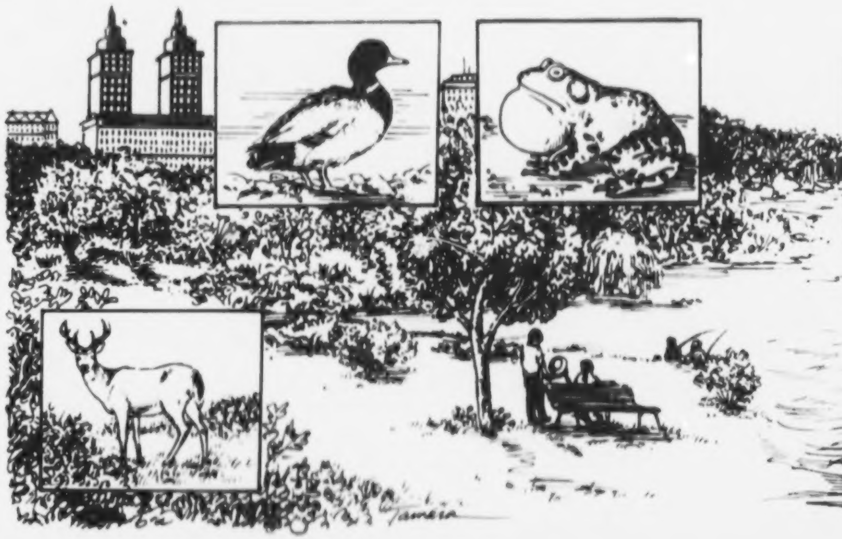
Activity 3-2: Rare Wildlife Species guides youths in finding information about rare and endangered species in New York State.

In **Activity 3-3: Habitat Diversity**, youths use the information they collected in **Activity 2-2: Neighborhood Survey** to compare the diversity of different habitats in their neighborhoods.

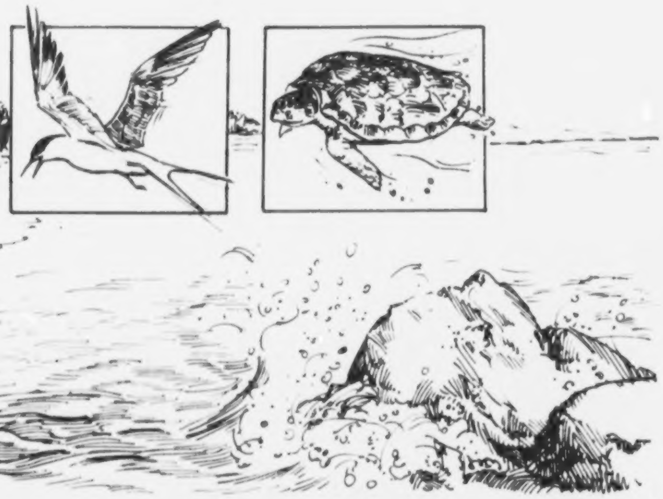
In Activity **3-4: Diversity from an Insect's Point of View**, youths collect insects and compare insect diversity in several different habitats.

Youths learn to make careful records of wildlife observations in **Activity 3-5: Recording Wildlife Observations in a Field Journal**.

Urban parks provide a habitat for many wildlife species.



Beaches may provide a habitat for threatened and endangered species such as the roseate tern and the loggerhead sea turtle.

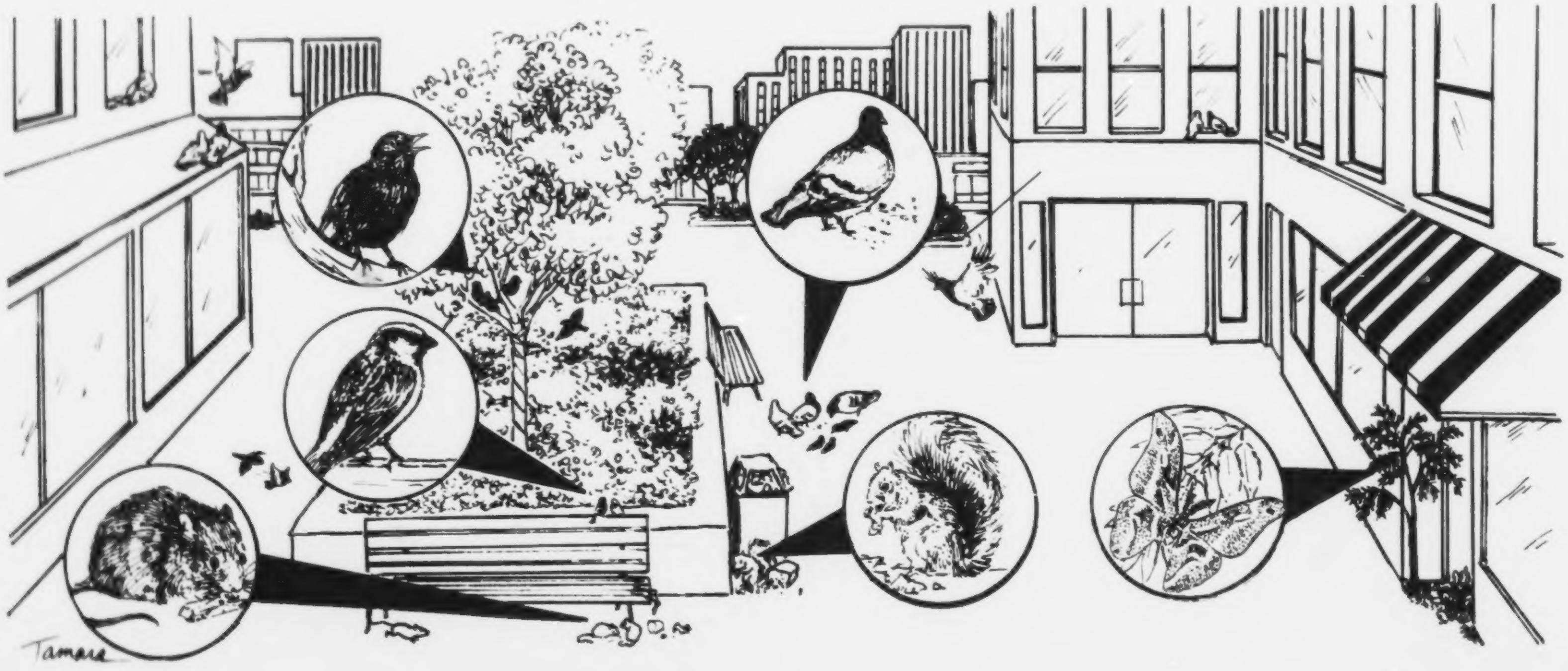


Urban Habitats: Midtown Manhattan

For a majority of wildlife species, midtown Manhattan or any other urban setting is a difficult place to find food, water, and sheltered sites for living, reproducing, and raising young. The relatively few species of trees planted in urban environments limit the types of food and nesting sites available for birds and other animals. For the wildlife species that do live in urban environments, however, the nearly total absence of predators and the protection provided from cold temperatures create ideal living conditions. These species reproduce rapidly and maintain large populations.

Many wildlife species inhabiting urban environments are not native to North America. They were introduced, intentionally or inadvertently, by humans. Many are omnivores or granivores, which thrive on the variety of food wastes found in cities. Because of their feeding habits, these urban species are sometimes referred to as the "junk-food guild." They use high-rise buildings as their homes now that their original nesting sites—cavities and cliffs—are gone. The European starling, pigeon, house sparrow, house finch, Norway rat, house mouse, and German cockroach are introduced urban species which occur in large numbers, thrive on a variety of foods, and readily inhabit human dwellings.

Some examples of urban species are described on the following pages.



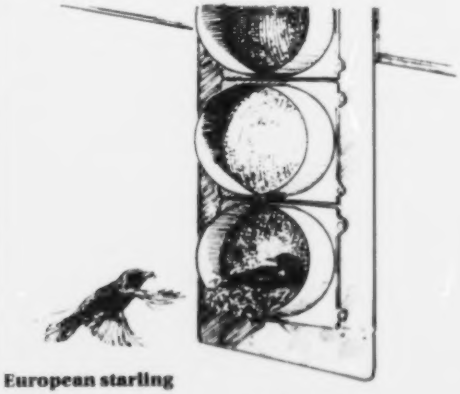
Cities provide habitats for wildlife such as the house mouse, European starling, house sparrow, pigeon, gray squirrel, and Cynthia moth.

European Starling

The first European starlings were intentionally introduced into Central Park in 1890. In less than a century, their descendants spread over the entire North American continent, making starlings one of the most numerous birds in North America. In 1960, just seventy years after the first arrivals in Central Park, more than 200,000 European starlings resided in Manhattan alone.

A cavity nester and nest-box occupant in rural areas, this species occupies a variety of city structures. Starlings have been found living in holes under the eaves of houses, among loose bricks in old chimneys, in air-conditioning units, in aircraft hangers, and even in the aircraft themselves.

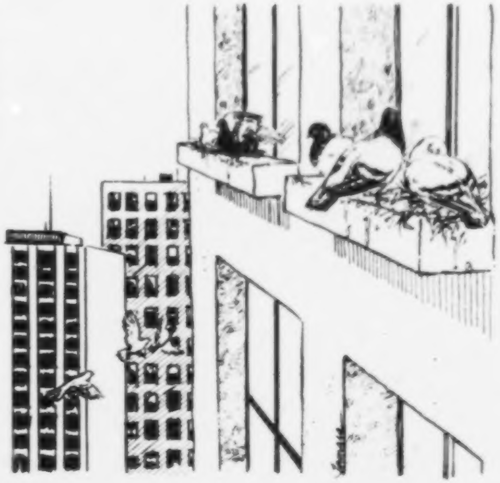
In rural areas, the European starling feeds largely on invertebrates such as insects, worms, and spiders. In urban areas, the starling has more cosmopolitan tastes. A study in one city revealed that invertebrates accounted for two-thirds of the starling diet and tidbits of sausages, other meat, macaroni, and bread made up the remainder.



European starling

Pigeon (Rock Dove)

In just about any city, anyone who walks under a bridge, by a building, or through a park does not doubt that the pigeon (or rock dove, the proper name) is very numerous in urban environments. Introduced into this country by early settlers (no one knows exactly when), the rock dove nests on window ledges, building cornices, bridges, and other human-made sites. It eats mostly waste grains, but in city parks it supplements its diet with peanuts and other human handouts.

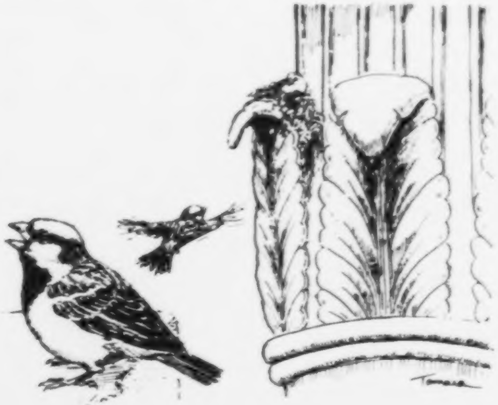


Pigeon

House Sparrow

The house sparrow was first introduced into North America in Brooklyn Park in 1850. Forty-two years later, an estimated 4,000 house sparrows were observed bathing in one little pool in Central Park! Primarily a granivore, this species also feeds on insects, particularly as a nestling. In the early 1900s, house sparrows thrived on the insects and grains present in horse manure on city streets. Although in rural areas house sparrows nest on cliffs and in cavities, in cities they are frequently found under the eaves of houses and in holes and crevices of buildings.

The recent decline in house sparrows can be attributed to factors related to their feeding and nesting habits. First, the replacement of the horse with the automobile reduced the availability of horse manure in cities. Second, the replacement of ornate Victorian homes with simply designed buildings reduced available nesting sites.

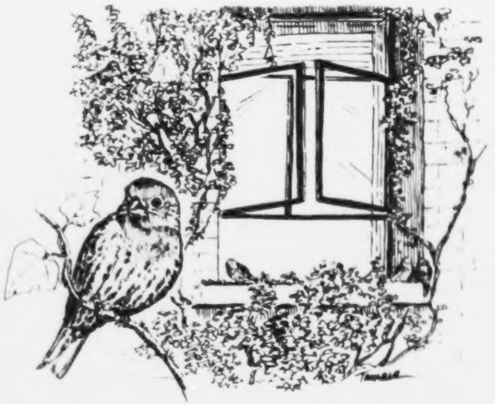


House sparrow

House Finch

The house finch, a more recent arrival to the urban scene, also may be partly responsible for the decline of the house sparrow. House finches compete with house sparrows for food and nesting sites, and house finches are more aggressive. The house finch, like the house sparrow, is primarily a granivore, and in cities it nests on buildings, particularly in ivy on walls and under eaves.

The house finch was introduced into New York State in 1940. Unlike the starling, the pigeon, and the house sparrow, it came from the western United States, not Europe. Since the early 1960s, house finch populations in the eastern United States have increased tenfold.

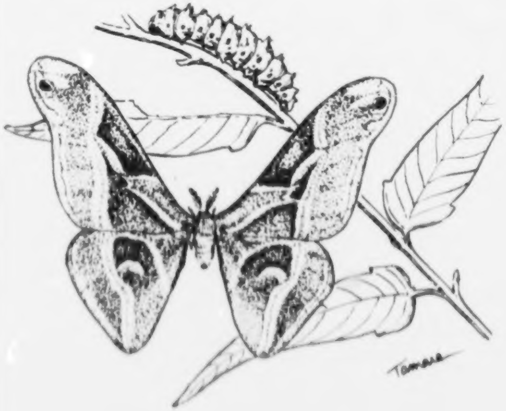


House finch

Cynthia Moth

Insects, such as the lovely Cynthia moth, may also thrive when introduced into urban areas. This particular moth was imported from Asia to produce silk. Although the silk experiment failed, the moth adapted successfully, thriving particularly in garbage dumps, abandoned factories, railroad yards, warehouses, and other areas where its predators are scarce.

Although adult moths don't feed, the caterpillars eat voraciously, but only ailanthus leaves. Therefore, Cynthia moths live on or near ailanthus shrubs. Ailanthus, also known as tree of heaven, paradise tree, "tree that grows in Brooklyn," or stinkweed, is commonly found in urban sites.



Cynthia moth caterpillar and adult on an ailanthus tree

Discussion Questions

- **What major groups of feeders and nesters would you expect to find in urban habitats?**
- **Why do so few species of wildlife live in urban areas?**
- **Why do so many individuals of one particular species often live in urban settings?**

(Hint: Habitats in cities have been greatly altered and they generally do not have a variety of foods and nesting sites for wildlife. For species that can use urban foods and nesting sites, however, the lack of predators and competing species and the protection from extreme cold make high populations possible.)

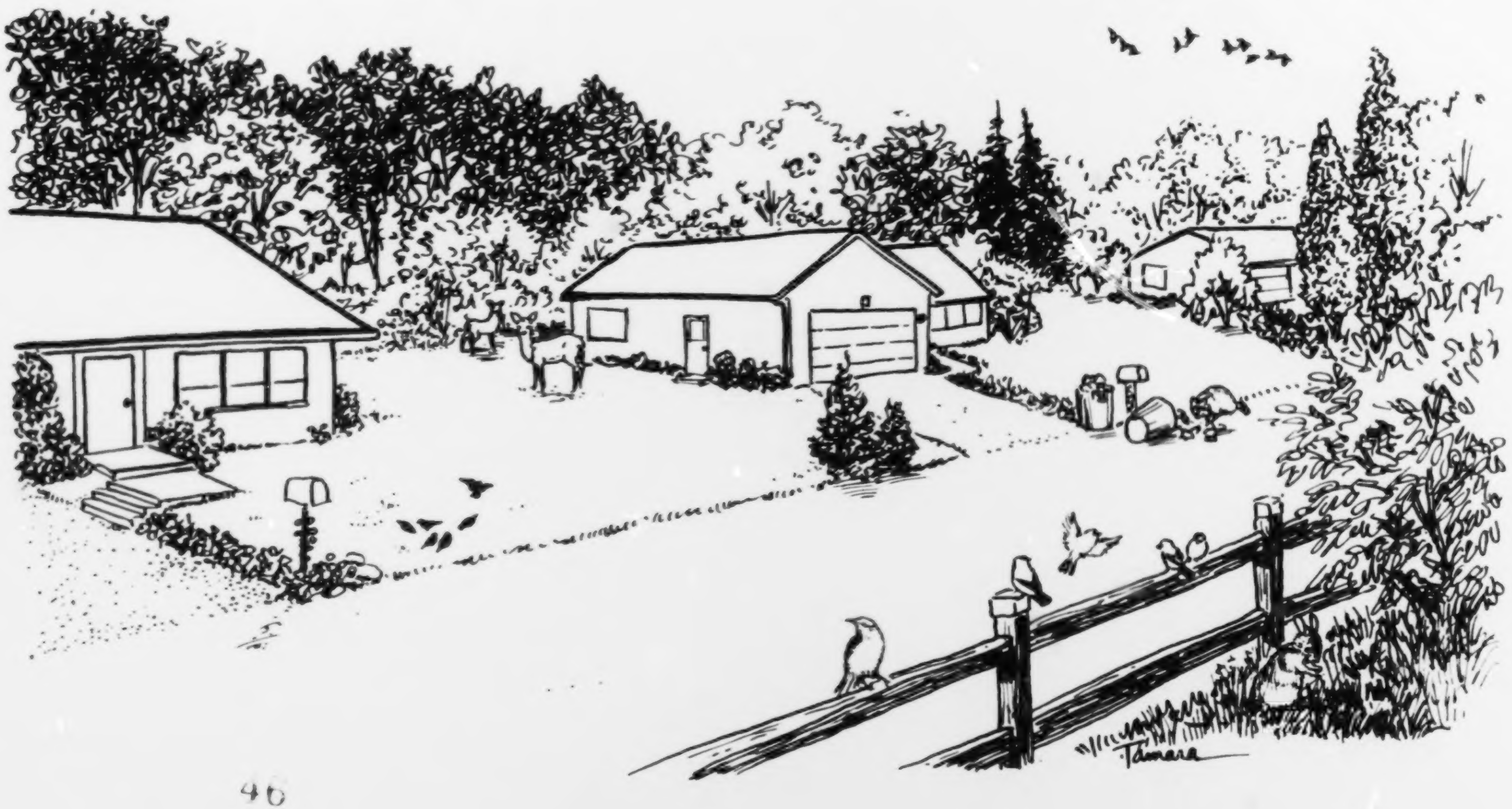
All Suburbs Are Not Created Equal

As you travel from a downtown urban environment to outlying suburbs, wildlife habitats change. The number and variety of trees and shrubs increase, providing more food, such as berries and nuts, and nesting sites for wildlife.

What does the increased diversity of vegetation in the suburbs mean for suburban wildlife? Richard DeGraaf, a wildlife biologist with the United States Forest Service in Amherst, Massachusetts, looked for the answer to this question. First, he studied the trees in suburban communities and compared them with trees in urban neighborhoods. He found suburban communities had three times more trees and species of trees (diversity) than urban neighborhoods. In addition, the tree species planted in suburban areas provided more food and nesting sites for birds than the trees in urban areas. The greater diversity of trees resulted in greater wildlife diversity: fifty breeding bird species were in the suburbs compared to only nineteen in the city.

Comparing Suburban Developments

After comparing wildlife in cities with that in suburbs, DeGraaf asked another question: Do different types of suburban developments support different types of wildlife? For example, do the wildlife guilds living in suburban developments with a low diversity of vegetation (i.e., with well-manicured lawns and few trees and shrubs) differ from the guilds living in suburban areas with diverse trees and shrubs?



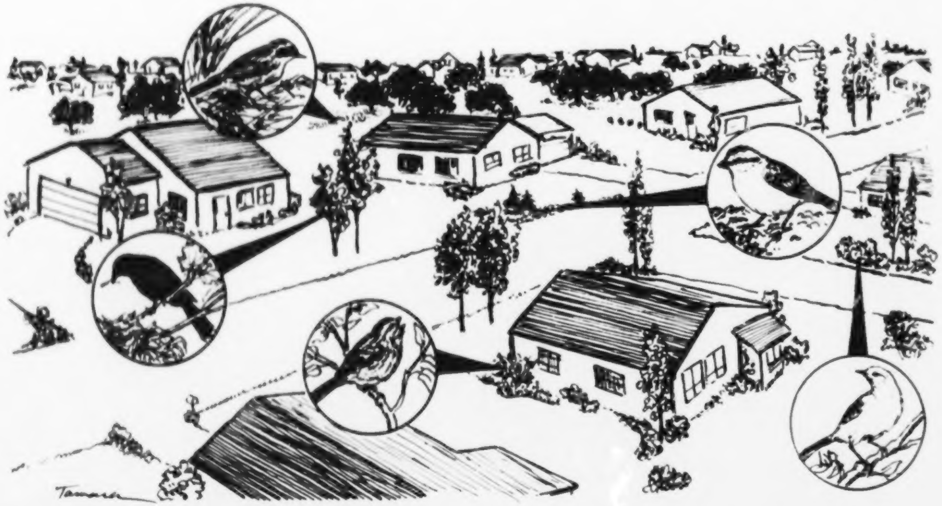
To answer this question, DeGraaf and co-worker James Wentworth studied the birds in three suburban neighborhoods in Amherst, Massachusetts. The oldest neighborhood was built around the turn of the century and had large houses along streets shaded by mature oaks, elms, and maples. The second neighborhood was built in the mid-1960s on open land; houses were surrounded by lawns with few large trees. The third neighborhood was also built in the mid-1960s, but the houses were built on existing woodland populated with large oaks, maples, and pines.

The wildlife biologists found that the total number of bird species was nearly identical for each neighborhood—about forty-eight species. The oldest neighborhood had the highest number of individuals, however, and the open suburb had the lowest.

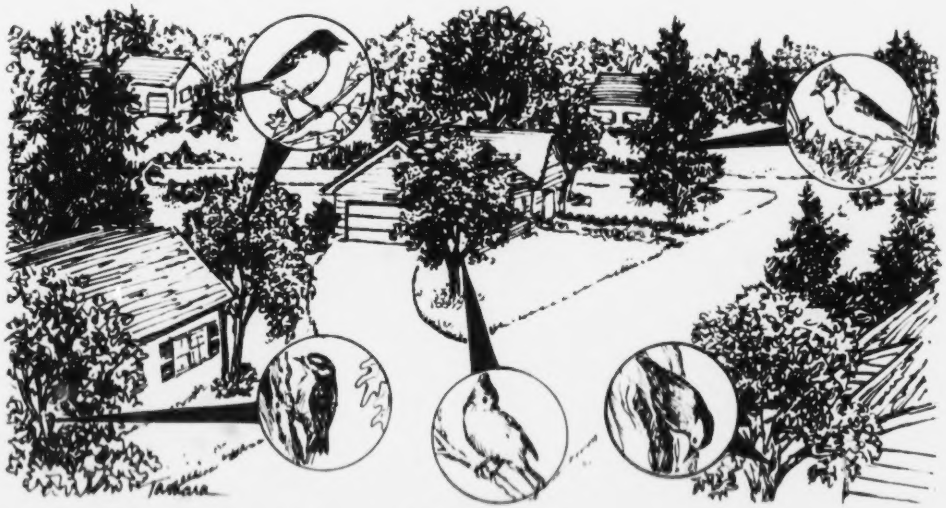
In addition, they found that the types of birds found in the three neighborhoods differed, and that these differences were related to the foods and nesting sites present in each suburban area.

The open neighborhood, for example, had the fewest insectivores because lawns provide a poor habitat for insects. The open area also had the fewest cavity nesters because there were few old trees with cavities for nests. Mostly ground nesters lived in this neighborhood.

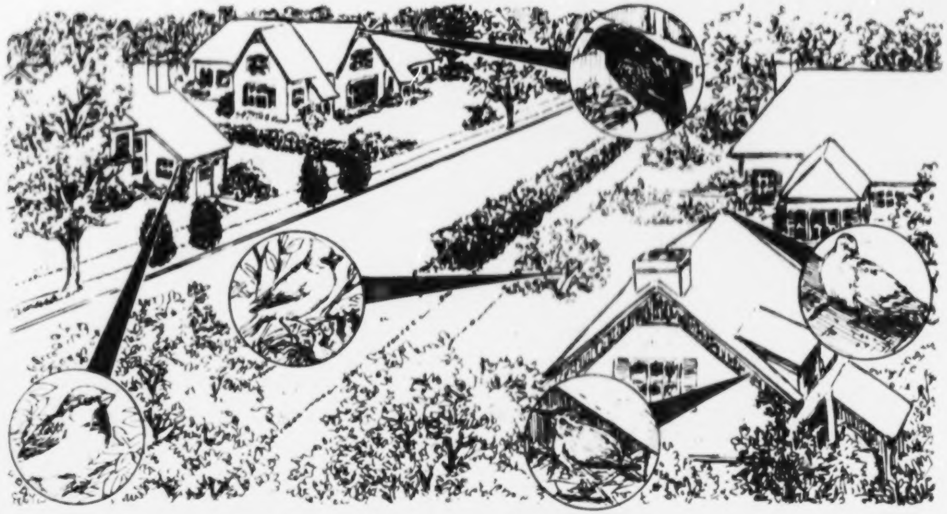
In contrast to the open suburban development, the wooded neighborhood had the largest number of insectivores and cavity nesters. Wooded areas around the houses provided the habitat necessary for these birds.



The open suburb with associated species *(left to right):*
common grackle, common yellowthroat, song sparrow, chipping sparrow, and northern mockingbird.



The wooded suburb with associated species *(left to right):*
northern oriole, downy woodpecker, tufted titmouse, white-breasted nuthatch, and blue jay.



Older houses and vegetation with associated species *(left to right):*
house sparrow, northern cardinal, house wren, European starling, and mourning dove.

The oldest neighborhood had the largest number of granivores, omnivores, and shrub and cavity nesters. Cavity nesters, such as the house sparrow and European starling, preferred the older, more ornate homes to the mid-1960s tract homes because the older homes provided more nesting sites.

Discussion Questions

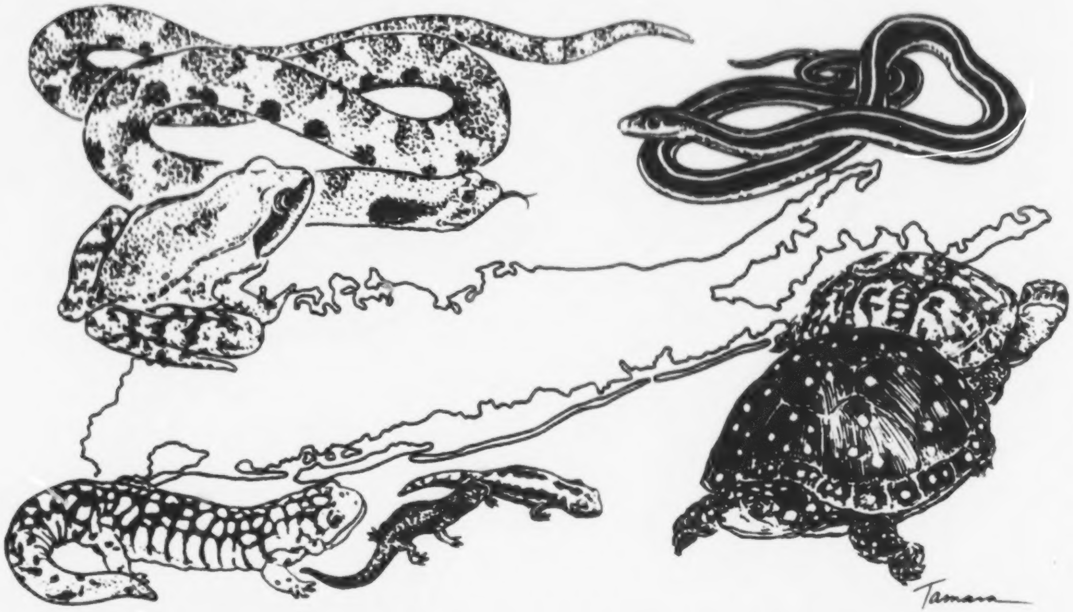
- **Do you live in a suburban neighborhood, or have you visited one?**
- **Does a suburban neighborhood you are familiar with have food for omnivores, granivores, and insectivores?**
- **Does it have nesting sites for tree nesters, cavity nesters, and ground nesters?**
- **What can be done to improve wildlife habitats in a suburban neighborhood?**

Survival in the Suburbs

Species that have flexible eating and nesting habits, such as the American robin, have flourished in suburban habitats. In contrast, species with highly specific habitat requirements are often unable to survive the changes to the landscape brought on by urban and suburban development.

Among those species with specific habitat requirements are many reptiles and amphibians. Salamanders, frogs, toads, turtles, and snakes often spend their adult life in woodlands but migrate to local ponds and wetlands to breed. Unfortunately, suburban development frequently means the loss of these aquatic breeding habitats. Ponds and wetlands are drained and filled to create dry land for construction projects. Groundwater use by expanding human populations lowers water tables, causing some seasonal ponds to dry up before the breeding season. Ponds also may become polluted. Even in areas where ponds remain undisturbed, suburban development may reduce the available woodland habitat for reptiles and amphibians, or children in search of pets may severely reduce populations.

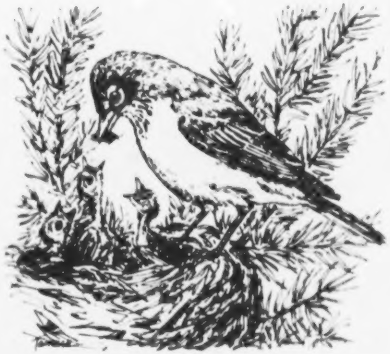
Several species of reptiles and amphibians have persisted in spite of habitat changes. An example is the Fowler's toad. This species can breed in almost any body of water and requires water for only a short time. Eastern garter snakes have also fared relatively well in suburban habitats. They do not require an aquatic habitat and feed on a variety of small mammals and insects. Eastern painted turtles and common snapping turtles have survived in suburban communities by residing in human-made lakes and ponds.



Reptiles and amphibians once found on Long Island that have lost much of their habitat include the eastern hognose and eastern ribbon snakes; the wood frog; the blue-spotted, eastern tiger, and marbled salamanders; and the spotted and box turtles.

American Robin

No discussion of suburban wildlife would be complete without mentioning the American robin. This traditional harbinger of spring feeds not only on earthworms, but also on a variety of insects, vegetables, and fruits. Because it often arrives at its northern breeding grounds before the deciduous trees leaf out, the robin's first nest of the season is usually in an evergreen tree. Successive nests are often built in deciduous trees. The American robin also nests on the ledges of buildings.



American robin

Discussion Questions

- What types of species flourish in suburban areas?
- What species disappear?
- What predators are present in suburban areas?

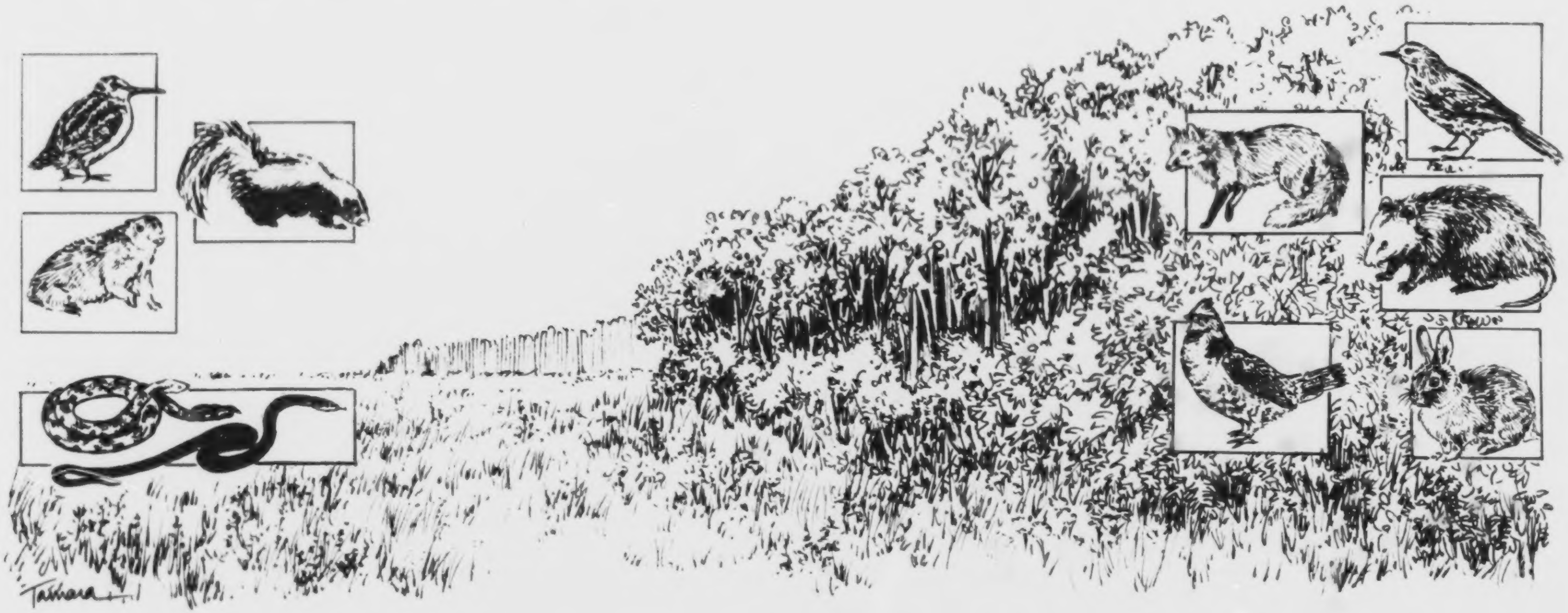
(Hint: For the most part, species that can use a variety of foods and nesting sites do better than species that have very specific habitat requirements.)

On the Edge: Farmlands and Woodlots

As we move to the suburban-rural interface—the land of farmlands and woodlots—we find wildlife that thrive in edge habitats. Edge habitats occur when two distinct plant communities, such as abandoned fields and aspen thickets or overgrown orchards and forests of maple and beech trees, come together. These habitats provide a variety of food sources and nesting sites. Therefore, a diversity of wildlife inhabits edge habitats.

Many species living in edge habitats—whether birds, mammals, reptiles, or amphibians—are omnivorous and eat insects, small animals, berries, and seeds. Because of their varied food habits, some edge species are pests in the garden and the garbage can. Others, such as mammals and snakes that feed on bird eggs, are important predators of songbirds that live in adjacent woodlots and forests.

The nesting habits of edge species also vary. For example, the northern oriole nests in trees, the northern mockingbird nests in shrubs near houses, and the American woodcock and ruffed grouse nest on the ground. Most edge mammals live in dens or burrows. Snakes inhabit fields, forests, or farm buildings, and a turtle called the red-eared slider resides in drainage ditches.

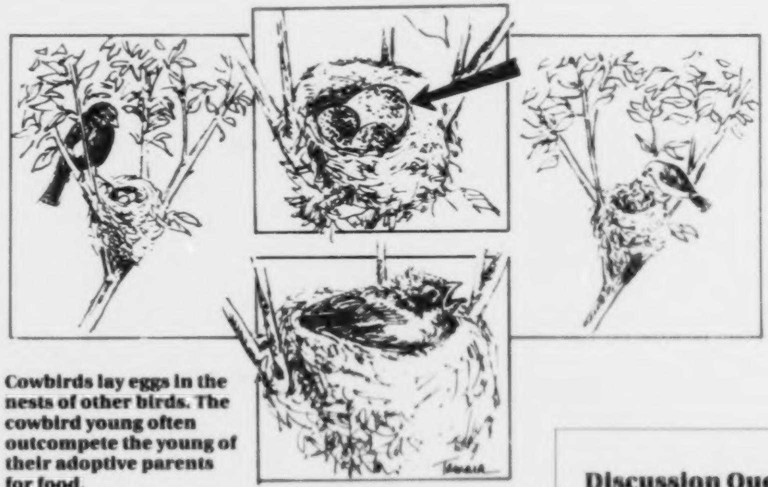


Edge habitat with associated species:
American woodcock, woodchuck, eastern hognose snake, black rat snake, striped skunk, red fox, ruffed grouse, brown thrasher, Virginia opossum, and eastern cottontail.

Brown-Headed Cowbird

Brown-headed cowbirds thrive in forest edges as well as on farms and in suburban areas. Cowbirds feed on seeds and insects in agricultural wastes. Modern agricultural practices that leave more wastes in the field have resulted in an increase in cowbird populations in recent years.

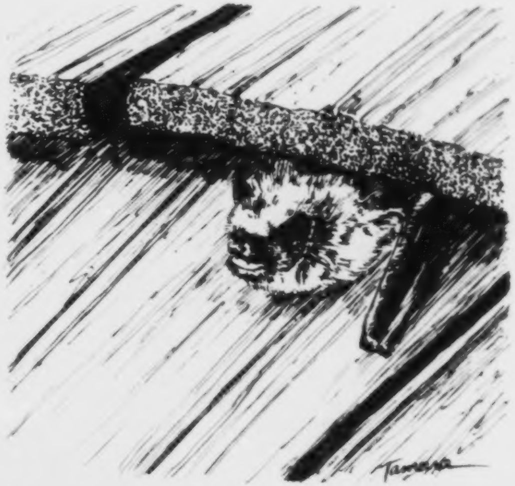
The cowbird has an unusual nesting habit—it builds no nest! Rather, it lays its eggs in the nest of another bird, often found in a woodlot or forest next to the edge habitat. The cowbird young are then raised by their adoptive parents, and they compete with the baby birds of their adoptive parents for food. Young cowbirds have been raised successfully by 121 known species of birds. Because they lay their eggs in the nests of other birds, cowbirds are considered parasites. The rise in cowbird populations is considered a major cause of the decline in populations of songbirds, whose nests are often occupied by parasitic cowbirds.



Cowbirds lay eggs in the nests of other birds. The cowbird young often outcompete the young of their adoptive parents for food.

Little Brown Bat

Many wildlife species found in edge habitats are also found in other habitats, such as forests and suburbs. One such species is the little brown bat. This common bat roosts under house shingles, in picnic pavilions, and in caves and hollow trees. In the spring, the females seek attics and barns to bear and raise their young. Little brown bats feed voraciously just after dark and before dawn on insects near ponds and streams. One colony of 100 little brown bats ate 42 pounds (19 kilograms) of insects during a four-month period.



Little brown bat

Discussion Questions

- **What types of wildlife flourish in edge habitats?**
- **How might the wildlife that live in edge habitats differ from the wildlife that live in suburbs or cities?**

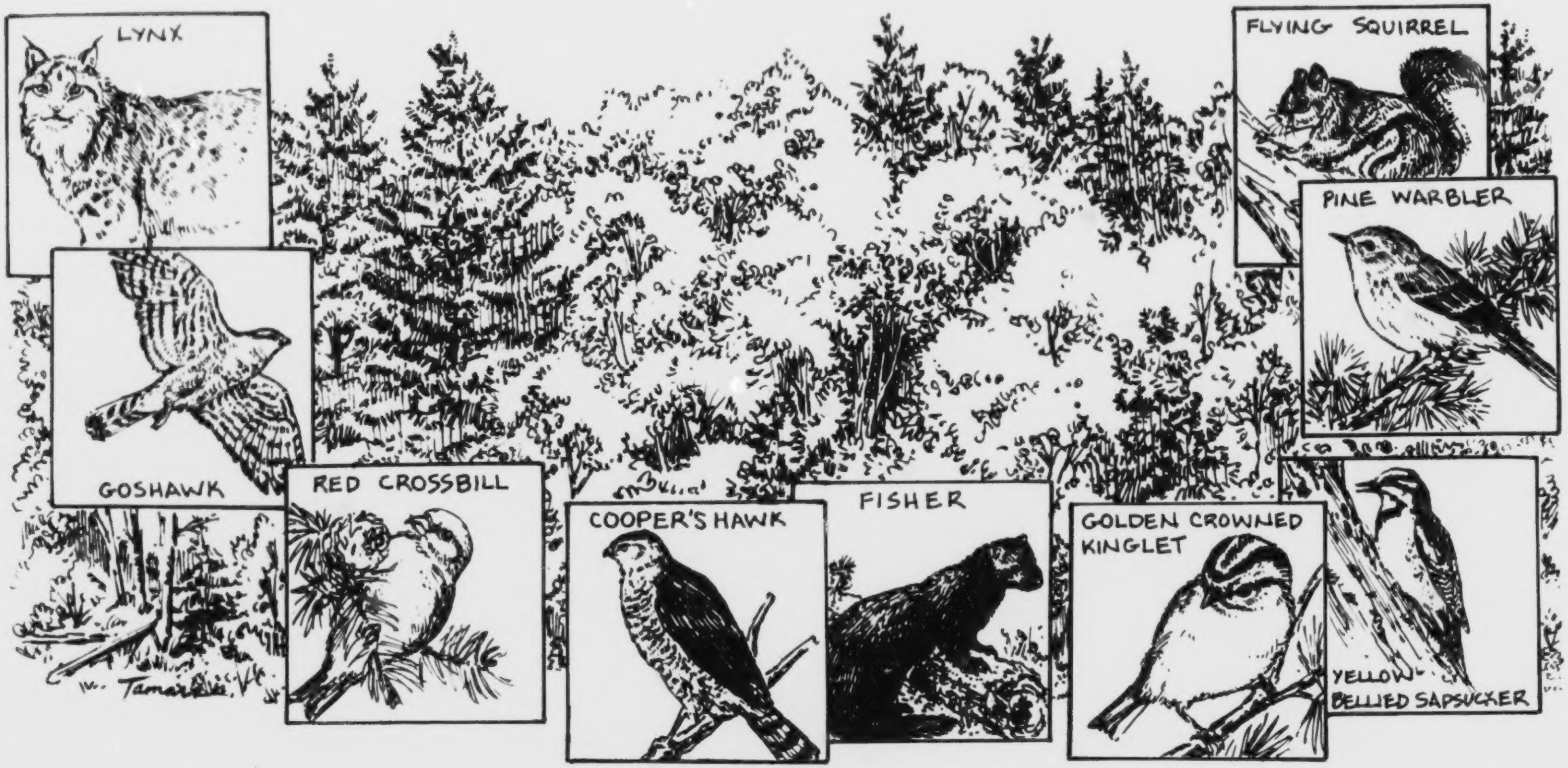
(Hint: There is a greater diversity of food sources and nesting sites in edge habitats, resulting in a greater diversity of wildlife. In particular, many more species of mammals live in edge habitats than in the suburbs. Many species living in edge habitats venture into suburban areas in search of food.)

Fragmented Forests

When European settlers first reached New York State, nearly all the land was forested. By the late 1800s, 80 percent of the land had been cleared for farms. Since then, much of the farmland has reverted back to forest. Today, 50 percent of the land in New York is forested. The forested area, however, is expected to decline as urban and suburban expansion continues. Maintaining forested land is essential to the survival of many wildlife species, including many of our songbirds.

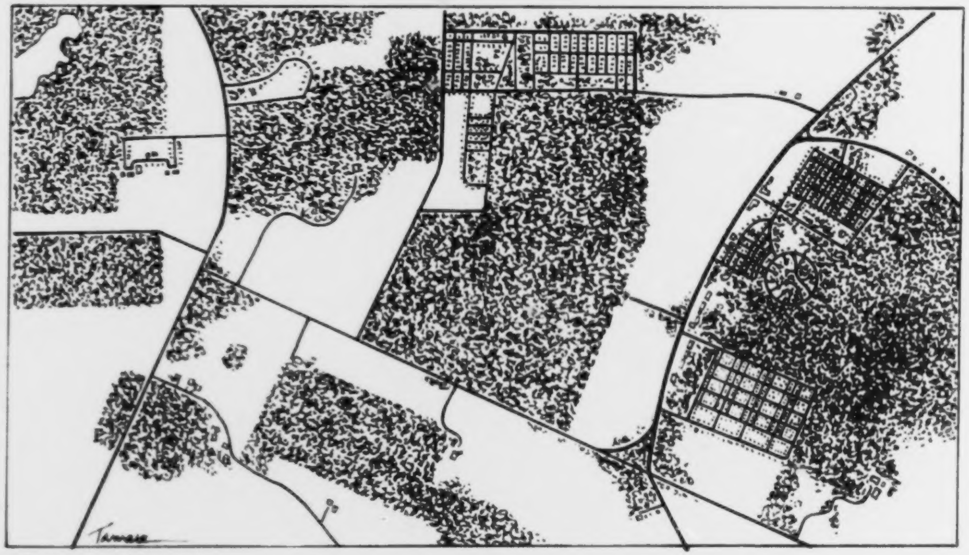
Other eastern states are not as fortunate as New York in having so much forested land. In these states, many of the songbird species inhabiting the interiors of forests, such as flycatchers, vireos, tanagers, thrushes, and warblers, have declined in number. To understand why this is happening, we must look at not only the total number of forested acres, but also the pattern in which forests occur.

Forests provide habitats for a variety of wildlife.

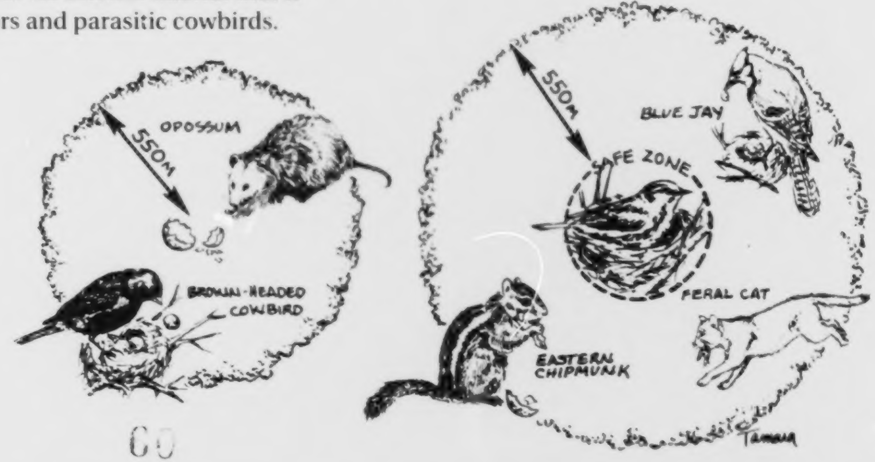

LYNX
FLYING SQUIRREL
PINE WARBLER
GOSHAWK
RED CROSSBILL
COOPER'S HAWK
FISHER
GOLDEN CROWNED KINGLET
YELLOW-BELLIED SAPSUCKER

In today's landscapes, forests occur as fragments, or islands, surrounded by suburban, urban, and agricultural development. The decline in the populations of many songbirds has been associated with forest fragmentation. (In addition to forest fragmentation in North America, the destruction of tropical forests, which provide a winter habitat for songbirds, may also be responsible for the decline in their populations.)

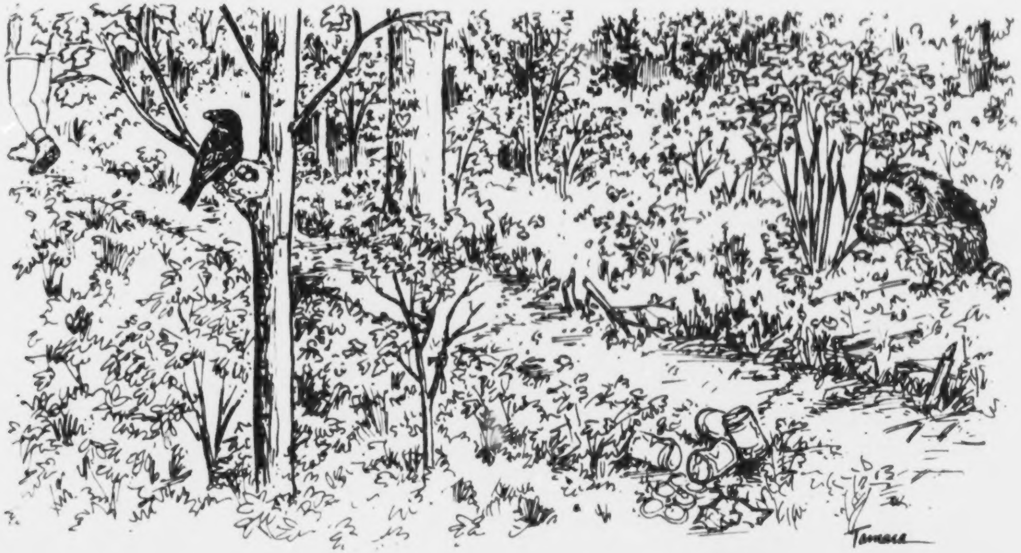
The edge habitat surrounding a forest often harbors numerous predators, including raccoons, opossums, skunks, chipmunks, blue jays, red foxes, and feral cats and dogs. In addition, brown-headed cowbirds inhabit the area surrounding forest islands. These species, which prey on and parasitize the nests of songbirds, roam up to 600 yards (550 meters) into the forest interior searching for eggs or nests. In a large forest, songbirds in the forest interior are safe from predators. In a forest island, however, there may be no safe nesting sites. A forest island that is circular in shape must have an area of at least 250 acres (100 hectares) to provide an interior habitat that is safe from predators and parasitic cowbirds.



A fragmented forest



Only large forest patches have safe zones which are free from predators and parasitic cowbirds living on the forest edge.



Trampling by humans, predation by mammals, and parasitism by cowbirds are common near the edges of forests.

Ground-nesting songbirds in small forest islands may be inadvertently trampled by humans and wildlife. Like edge species, humans are more likely to go a short distance into a forest than to venture a long distance into a forest interior.

Songbirds that require large areas of undisturbed forest are known as area-sensitive species. For these birds, only large forested habitats provide the protection from predators, parasites, and trampling and the diversity of foods and nesting sites necessary for survival. Therefore, it is important to preserve large tracts of forested land as well as other habitats.

Discussion Question

- **Compare the threats to wildlife living in small forest fragments with those to wildlife in large forest preserves.**

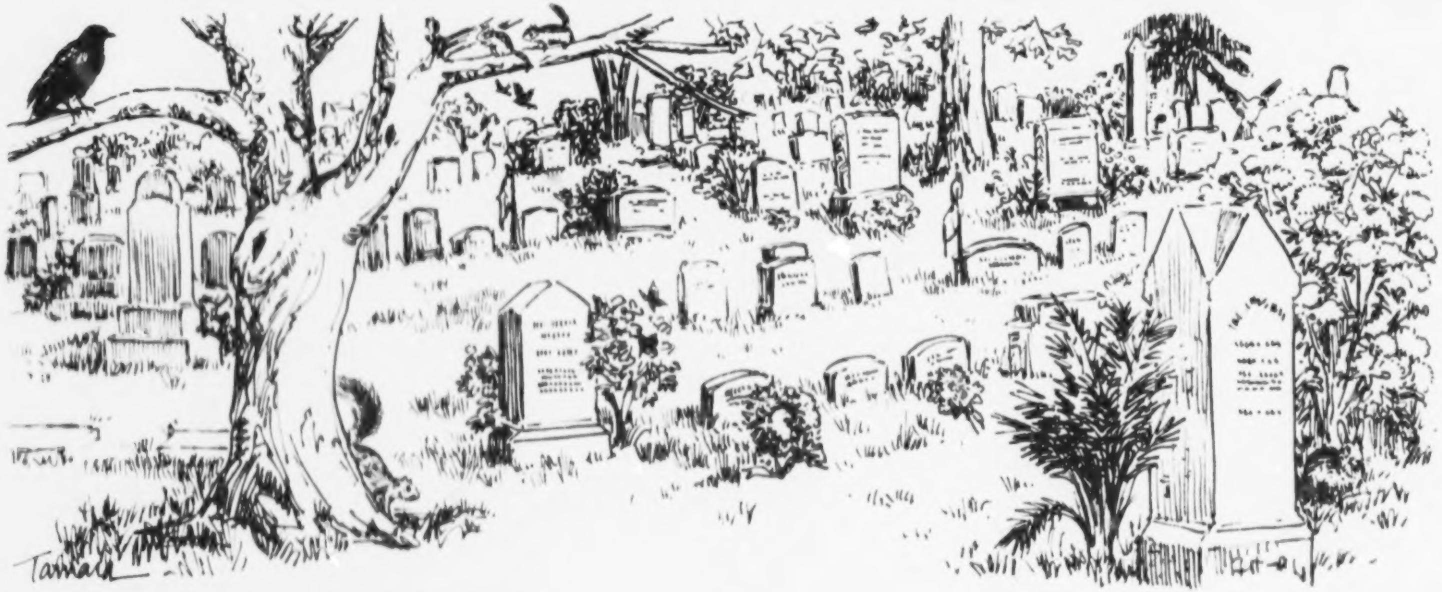
Small Parks, Preserves, and Wildlife Refuges

Small parks, preserves, and refuges are intensively managed for human recreation, wildlife, or a combination of the two. In urban areas, many different types of green spaces, such as cemeteries and parks, provide valuable wildlife habitats. Green spaces that are landscaped to include trees and shrubs rather than just mowed grass provide habitats for many species of wildlife.

Some parks have been extensively modified to attract wildlife. In New York City particularly, efforts to restore habitats and associated wildlife species in areas disturbed by humans have been successful. A few of these exciting efforts are described below.

Ruler's Bar Hassock is the largest island in the Gateway National Recreation Area's Jamaica Bay Wildlife Refuge. A 1979–80 inventory of the reptiles and amphibians on this island revealed that only a portion of the native species capable of being supported by the diverse habitats was present. Refuge staff members and volunteers wanted to transplant salamanders, frogs, turtles, and snakes onto the island. But before transplanting any animals, they made a number of habitat improvements. For example, they piled boards, driftwood, leaves, and wood chips to provide shelter. To create wetlands, they dug small ponds and planted aquatic vegetation.

Refuge personnel transplanted eleven species of salamanders, toads, frogs, turtles, and snakes onto the island. Volunteers and professional wildlife biologists collected the animals from areas undergoing suburban development. In addition, to increase the number of eastern hognose snakes available for transplanting to

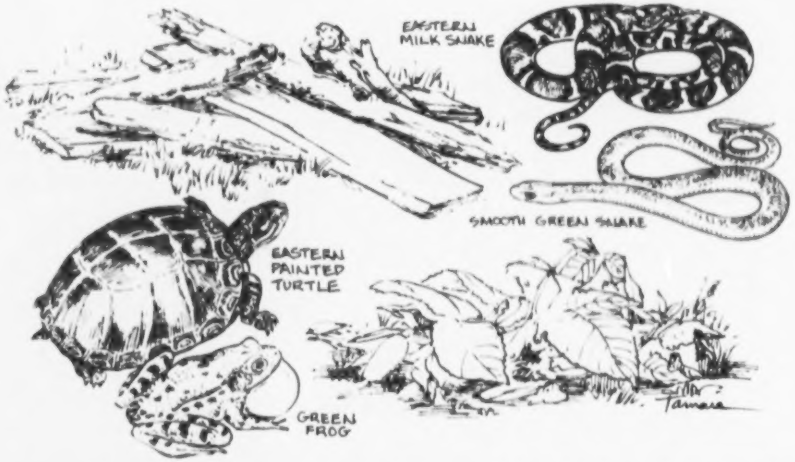


Cemeteries provide refuges for wildlife in urban areas.

the island, a captive rearing program was instituted in cooperation with the Bronx Zoo.

Many of the transplanted species have become established on the island. In fact, the effort has been so successful that it has been expanded to other sites in the wildlife refuge.

Volunteers have assisted the professional wildlife managers in many other efforts to restore wildlife habitats and species at the refuge. For example, volunteers from the New York City Audubon Society have helped convert Floyd Bennett Field into a grassland habitat. They anticipate that several grassland birds, including grasshopper sparrows, upland sandpipers, eastern meadowlarks, short-eared owls, and northern harriers, will nest on this site.



Some of the reptiles and amphibians introduced at Ruler's Bar Hassock, Jamaica Bay Wildlife Refuge

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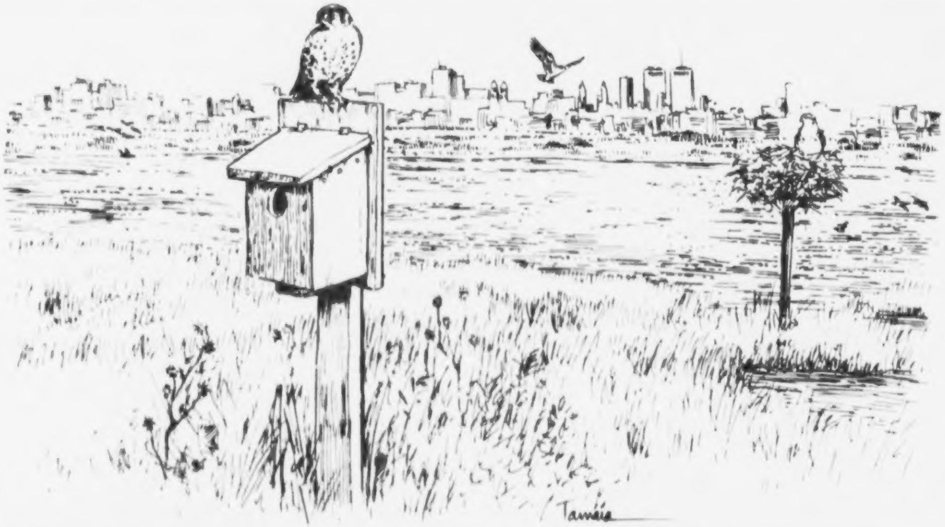
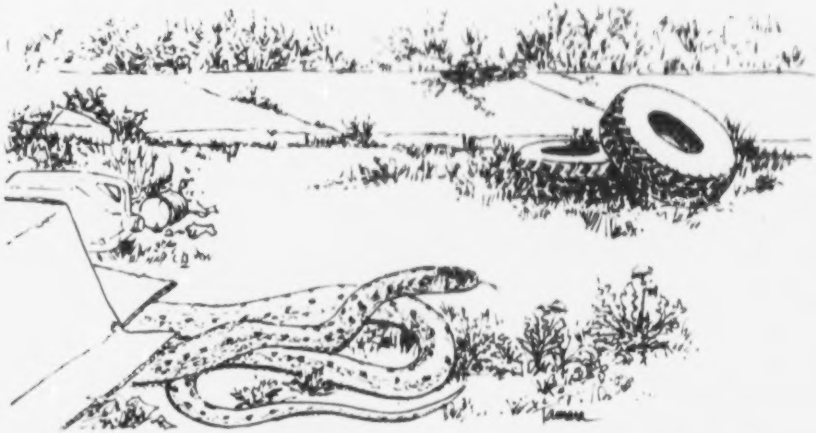
In another effort, volunteers from the Sierra Club have helped restore a salt marsh habitat and have erected osprey platforms. Elsewhere on the refuge, cavity nesters, including tree swallows, common barn owls, American kestrels, and house wrens, use nest boxes placed by volunteers. In addition, several butterfly gardens have been planted.

Even without intensive management efforts, urban parks can provide refuge for species that are not present in suburban developments. Northern brown snakes, for example, survive better in the parks of New York City than in the suburbs of Long Island. (The snakes also use refuse on vacant city lots as nesting sites.)



An American kestrel with a nest box and an osprey with a nesting platform erected by volunteers at the Jamaica Bay Wildlife Refuge



A northern brown snake in an abandoned lot

Discussion Questions

- **What steps would you take before transplanting a species into an urban park?**
- **How might the wildlife found in urban parks differ from the wildlife found in large forest preserves?**

(Hint: You would have to restore the habitat for the species prior to transplanting it. Species that require large areas of intact forest, such as some songbirds and many predators, would not be found in urban parks.)

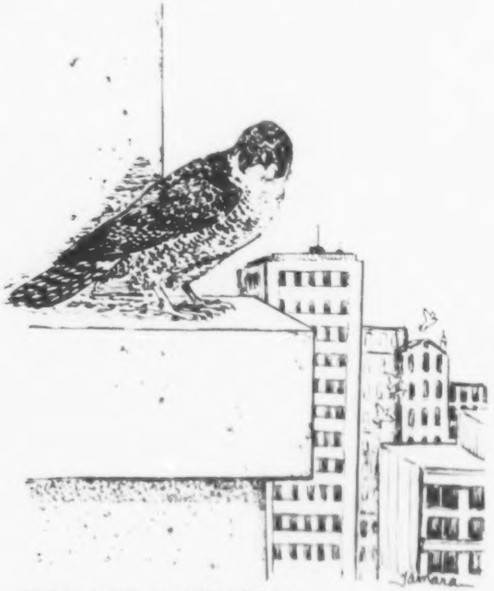
Habitats of Threatened and Endangered Species

When the population of a species drops to a certain low level, the remaining individuals may not be capable of reproducing sufficiently to ensure the survival of that species. The species is then in danger of extinction. In 1973, Congress passed the Endangered Species Act to protect endangered plant and animal species (those species that are in danger of extinction). The act also protects threatened species—those plants and animals that may soon become endangered. Each year, the United States Fish and Wildlife Service publishes a list of threatened and endangered species.

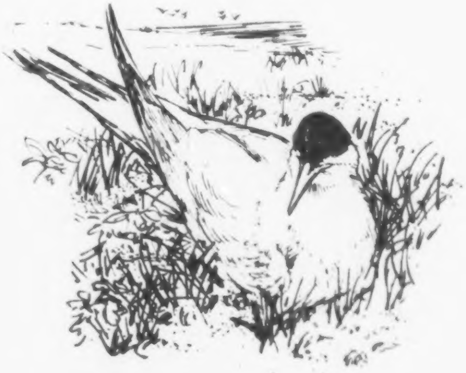
Most states, including New York, have passed their own endangered species acts. In addition to threatened and endangered, New York State considers a third category in its legislation—species of special concern. These are species whose populations may become threatened. As of 1987, the New York State Department of Environmental Conservation listed 34 endangered species, 16 threatened species, and 35 species of special concern. (This list is in the pocket folder.)

What causes the population of a species to reach drastically low levels? Although excessive hunting and fishing once caused serious population declines and the extinction of some game species, today most important game animals are protected by strict regulations. In general, conservationists are no longer concerned about game species being hunted to extinction in North America.

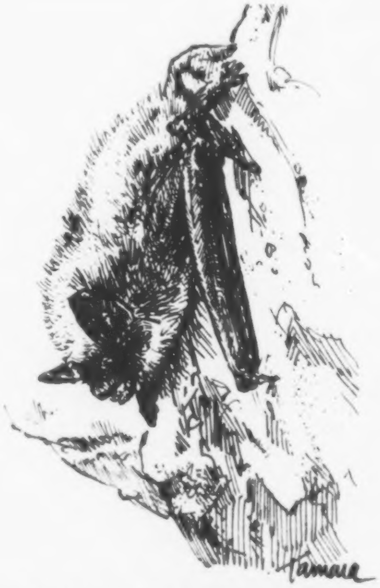
The destruction of wildlife habitats is now the most important cause of declines in wildlife populations. Because many endangered species have very specific habitat requirements, they cannot adapt to new habitats if their original habitat is altered or destroyed. In addition to habitat destruction, environmental pollution may, in some cases, contribute to declines in wildlife populations.



Endangered: peregrine falcon



Threatened: common tern



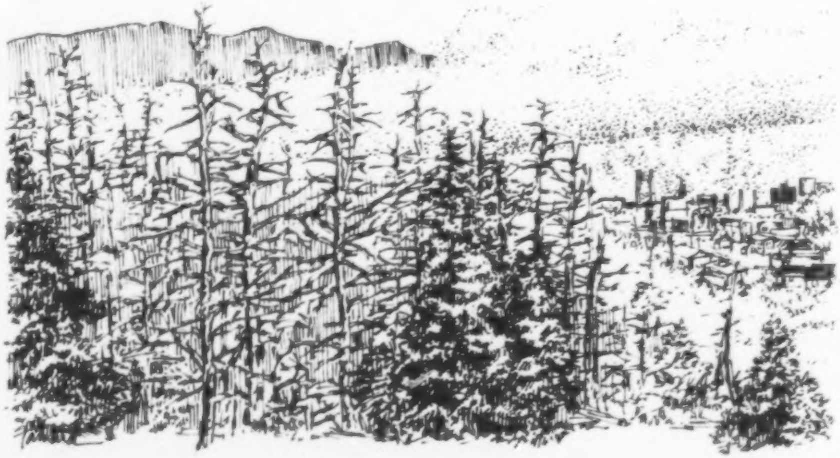
Special concern: small-footed bat

Once a species becomes endangered, it may never recover. In addition, the costs and effort involved in maintaining endangered species are often considerable. For example, the cost to raise and release a single chick of the endangered peregrine falcon is about $18,000. Protecting a species and its habitat before it is threatened or endangered usually costs much less. Therefore, it is essential that we work to stop habitat destruction and resulting population declines before a species becomes threatened or endangered.

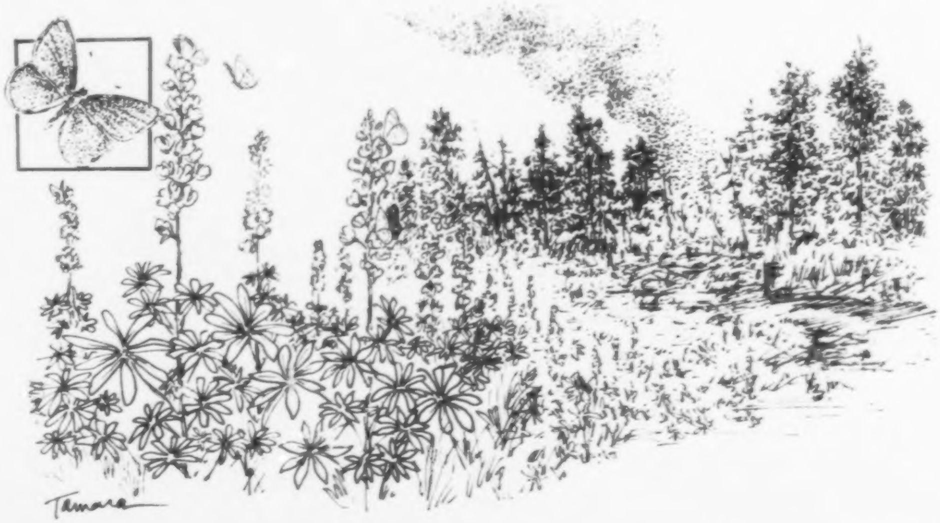
Some descriptions of endangered and rare species and their habitats follow.

Karner Blue Butterfly

The Karner blue butterfly is found only in dry, sandy areas with open woods and clearings where wild blue lupine flowers grow. The caterpillar of the Karner blue butterfly feeds exclusively on this species of lupine. The dry, sandy habitat of this lupine occurs largely along river valleys—areas that in New York State have been developed for agriculture and towns and cities. Populations of the Karner blue butterfly around New York City have become extinct. Today, the Karner blue butterfly is found in New York only in scattered locations along the Hudson Valley sand belt, from the Albany pine bush area north to the Glens Falls area. The New York State Department of Environmental Conservation and The Nature Conservancy are developing methods for enhancing or creating habitats suitable for the wild blue lupine (such as mowing and controlled burning) and working cooperatively with private landowners to protect and manage existing habitats of the Karner blue butterfly.



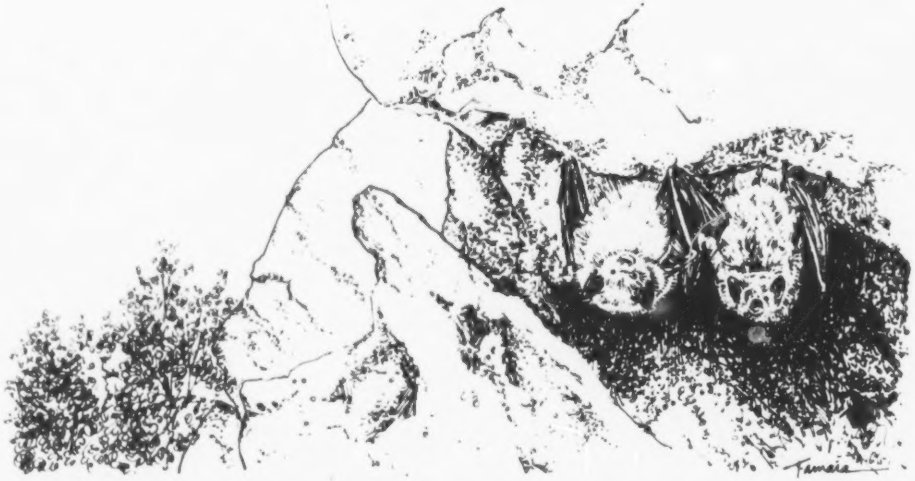
Pollution and development can destroy wildlife habitats.



Controlled burning enhances the establishment of the wild blue lupine and the Karner blue butterfly.

Indiana Bat

The Indiana bat, like the Karner blue butterfly and many other endangered species, has very specific habitat requirements. About 97 percent of all Indiana bats hibernate in just a few large caves in the midwest. A few colonies of Indiana bats also hibernate in caves in western New York. The bats in any one cave may number in the thousands. By depending on just a few caves, however, the bats are very vulnerable to extinction. For example, the flooding of one cave or the disturbance of one cave by humans could eliminate a very large proportion of the total population of Indiana bats.

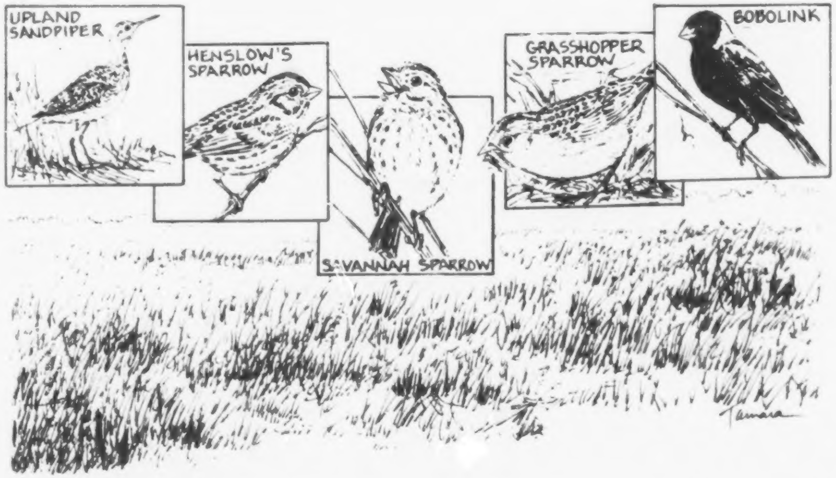


The Indiana bat, an endangered species

Pastureland Birds

In recent years, many of New York's pastures and farmlands have been converted to forests and urban developments. Birds that live in pastures and hay fields have suffered from the loss of their habitat. In addition, a trend toward earlier and more frequent cutting of hay fields may destroy nests and contribute to population losses.

Populations of pastureland birds, such as the savannah sparrow, the Henslow's sparrow, the grasshopper sparrow, the bobolink, and the upland sandpiper, have all seriously declined over the past 25 years. The Henslow's sparrow and the grasshopper sparrow are now listed as species of special concern.



Some pastureland birds whose populations have declined in recent years

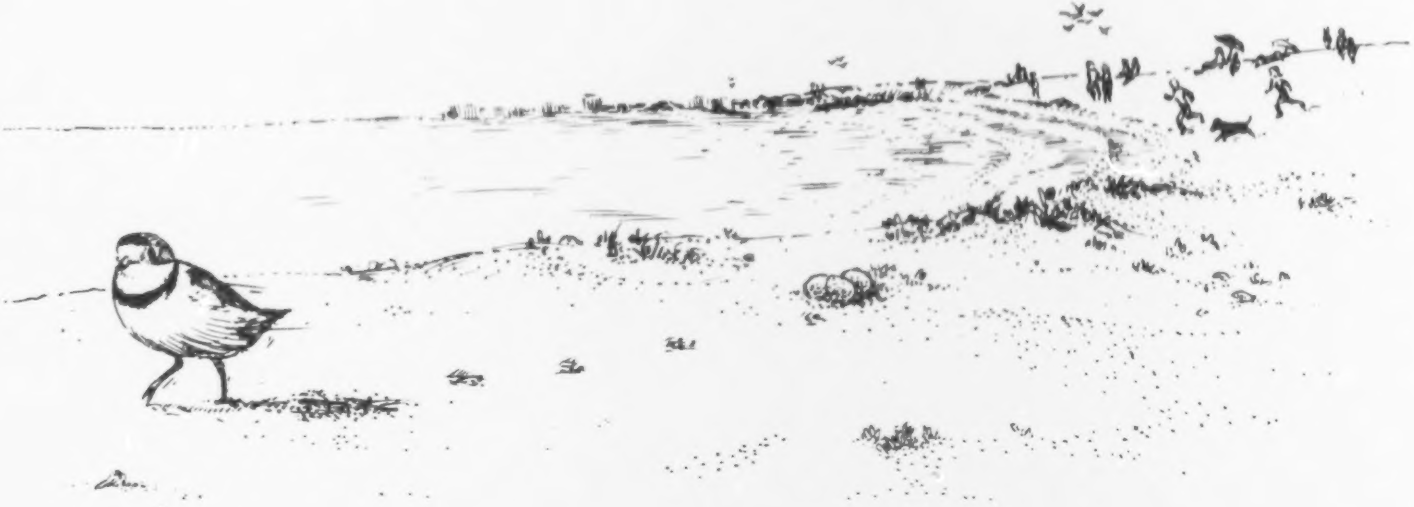
Piping Plover

The piping plover is another endangered species in New York State. The habitat of this bird has been severely affected by human activities. Piping plovers nest on wide stretches of open beach with sparse vegetation. Coastal development and shoreline stabilization, which include the construction of vacation homes and breakwaters and the planting of sand dunes, are destroying the habitat of the piping plover. These developments also impede the natural forces that create a new beach habitat.

Humans and other animals may also cause populations of the piping plover to decline. An ever-increasing number of people and their pets, such as cats and dogs, visit beaches and disturb nesting adults. Adult birds often leave their nests when disturbed, exposing their eggs to the hot summer sun and to predators. Human visitors may also interrupt feeding and courtship activities.

Predators of the piping plover include many of the urban, suburban, and edge species that have thrived as a result of human activity, such as the Norway rat, the raccoon, the Virginia opossum, the striped skunk, the American crow, the herring gull, and the great black-backed gull, as well as domestic dogs and cats.

The management and protection of the piping plover and other colonial waterbirds that occupy similar habitats (such as the common tern, the least tern, the roseate tern, the black tern, and the Caspian tern) require the cooperative efforts of many individuals, organizations, and agencies. On Long Island, private organizations have joined local, state, and federal government agencies to form the Long Island Colonial Waterbird Association. The activities of the association include surveying colonial waterbird populations and their nesting success and researching how they select habitats. Members of the association also have worked to protect waterbirds by posting, fencing, and actively patrolling nesting sites and by educating the public about the importance of preserving these birds.



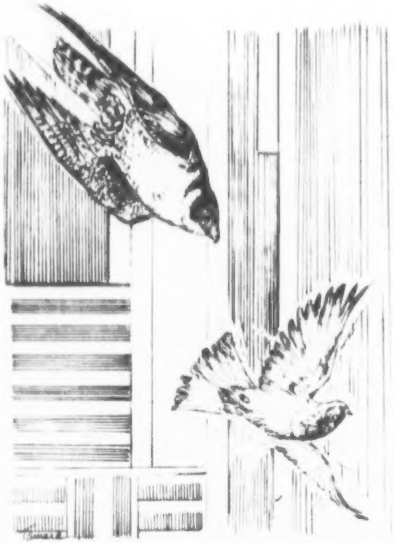
Piping plovers are vulnerable to disturbance by humans.

Peregrine Falcon

In addition to habitat destruction, pollution has caused declines in wildlife populations. Environmental pollution by the chemical DDT resulted in the extinction of the peregrine falcon in the eastern United States during the 1950s and 1960s. The story of the reintroduction of the eastern peregrine falcon following the banning of DDT in the United States in 1970 is an interesting one.

Peregrine falcons prey on birds flying in the air and nest on cliffs. Because earlier sitings of peregrine falcons in New York City showed that their food and nesting requirements could be met there (they ate pigeons and starlings and nested on buildings and bridges), a decision was made to reintroduce the falcon into the city. The reintroduction program also was used to stimulate interest and awareness about the plight of endangered species. A captive breeding program was started to provide birds for reintroduction.

In 1980 and 1981, several young peregrine falcons were released in New York City. As of 1989, eight pairs—descendants of the original birds—were living in the city. Six of these pairs nested and four successfully fledged young. The birds have built nests throughout the city in such places as the Verrazano Narrows Bridge, the Throgs Neck Bridge, a Cornell Medical College building, and a church in Riverside.



A peregrine falcon strikes a pigeon in midair.

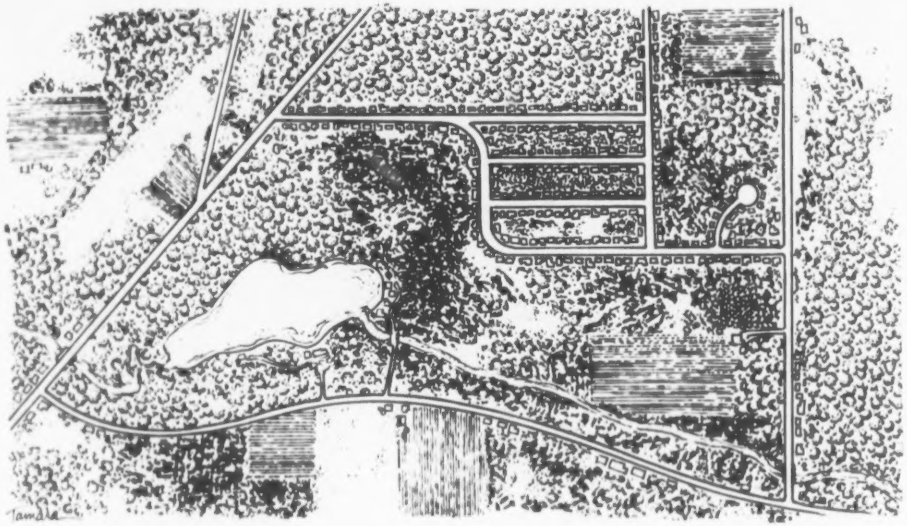
Discussion Questions

- **What is the most common cause of declines in wildlife populations?**
- **Why is it important to protect a species before it becomes rare or endangered?**
- **How might a species be protected?**

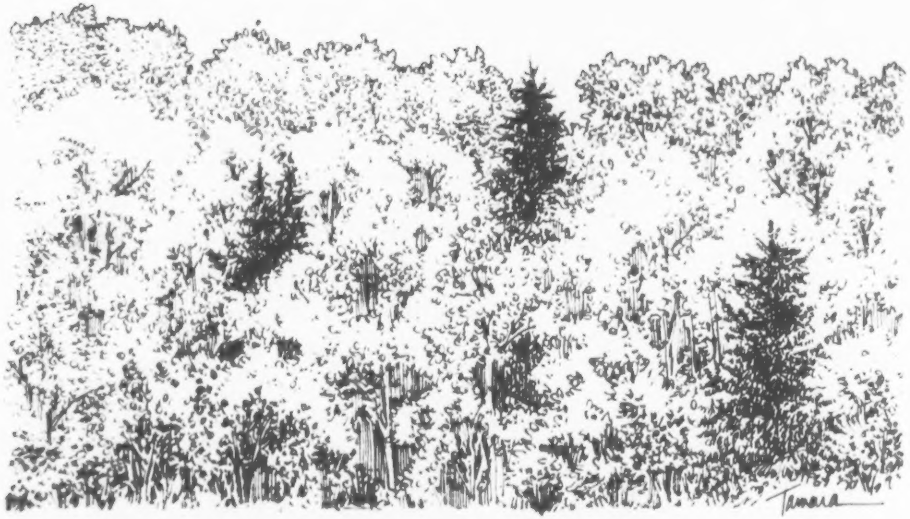
(Hint: Habitat destruction is the most important cause of declines in wildlife populations; therefore, it is important to protect wildlife habitats. It generally costs much more to protect a species that has already become rare or endangered than to protect a species while it is still relatively common.)

Habitat Diversity

Flying over New York State, one sees a patchwork of cities, small towns, farmlands, woodlots, and large tracts of forest. In short, New York has a diverse landscape with a variety of habitats supporting many different types of wildlife. There is also diversity within each habitat. Some habitats are more diverse than others. Let's look at diversity in two wildlife habitats in New York.



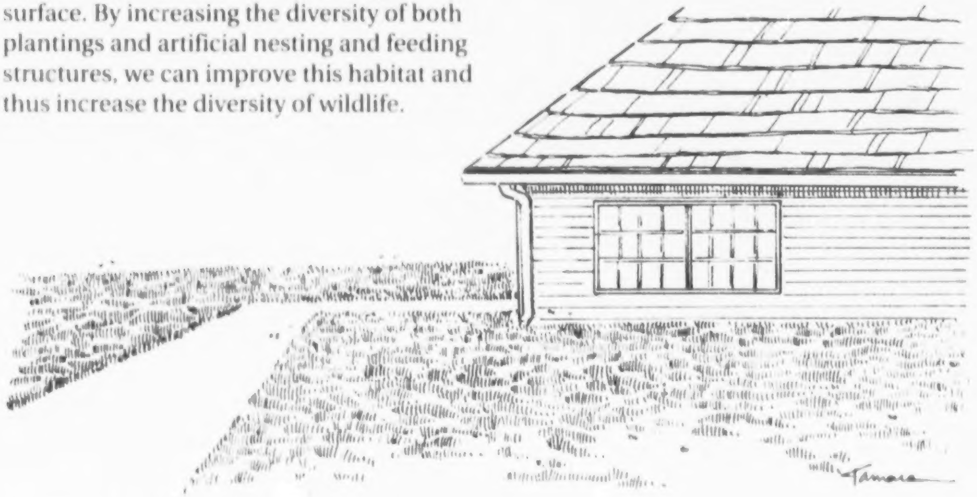
A patchwork of wildlife habitats



A mature forest has a diversity of tree species and layers of vegetation.

A large expanse of undisturbed forest has a great deal of diversity within its boundaries. Tree species can include American beech, sugar maple, red maple, American basswood, red oak, eastern hemlock, and ironwood. From the top of the trees down to the ground, the forest also has many layers of vegetation—tall trees, medium-sized trees, small trees, shrubs, and ground plants. The surface of the ground is also diverse, with small mounds and depressions, gullies, and streams. The variety of plants, layers of vegetation, and ground surfaces in an undisturbed forest provides many different foods and nesting sites for wildlife, resulting in wildlife diversity.

What about the mowed lawn of a suburban development? Here we find few plant species (the development of species diversity has likely been arrested by mowing or herbicides), one layer of vegetation, and a uniform ground surface. By increasing the diversity of both plantings and artificial nesting and feeding structures, we can improve this habitat and thus increase the diversity of wildlife.



A mowed lawn is not a very diverse wildlife habitat.

Discussion Questions

- **What is meant by diversity within a landscape?**
- **What is diversity within a habitat?**
- **What are the sources of diversity within a habitat?**

(Hint: A diverse landscape has many different types of habitats. A diverse habitat has a variety of foods, water sources, and nesting sites. The variety of foods, water sources, and nesting sites is provided by many different plant species, layers of vegetation, and ground surfaces.)

Activity 3-1: Wildlife Pests

In this activity, youths assess the suitability of their school or home as a habitat for pest species. They need to find out the food, water, and nesting requirements of house mice, silverfish, house flies, cockroaches, or other pest species. Youths can contact their library or local Cornell Cooperative Extension office for help in finding information about a pest species and completing the Wildlife Pests Activity Record.

After the youths have completed the record sheet, ask them the following questions:

- To what feeding group does the species you researched belong? To what nesting group?
- Does your home or school provide the necessary food and nesting sites for your species?
- How might you get rid of your species?
- Are there alternatives to using chemicals that might get rid of your species? (Hint: It might be possible to eliminate some of the food sources and nesting sites on which your species depends.)

Activity 3-2: Rare Wildlife Species

Through this activity, youths learn how a species might become endangered and what steps can be taken to protect rare and endangered species. Youths participating in this activity will need to seek outside sources of information.

Ask the youths in your group to describe the meaning of "threatened and endangered species." Then ask if they know the names of any threatened or endangered species. Photocopy and hand out the list of endangered and threatened species and species of special concern in the pocket folder. Why are these species endangered or rare? What can be done to protect them?

Youths may work alone or in groups. Have each youth or group choose one threatened or endangered species, species of special concern, or species whose population is declining (for example, flycatchers, vireos, tanagers, thrushes, warblers, bobolinks, savannah sparrows, and upland sandpipers). Ask each youth or group to research the following questions about their species:

- Why is the species in danger of extinction and (or) experiencing population declines?
- Is the decline due to the lack of one or more resources, i.e., food, water, nesting sites?
- What is happening to the habitat of the species?
- What can people do to prevent the population decline and encourage recovery of the species?

The youths may want to draw up a management plan for protecting the species, outlining the specific steps necessary to reverse the population decline in an area. As part of their management plan, youths should describe the habitat required by the species, explain how the habitat can be protected, and suggest other possible actions, such as reintroducing the species into a remaining suitable habitat.

The youths can obtain more information about the species they have chosen by writing to the state Department of Environmental Conservation, Endangered Species Unit, Delmar, NY 12054, or the United States Fish and Wildlife Service, Office of Endangered Species, 1 Gateway Center, Newton Corner, MA 02158. Local libraries and chapters of the Audubon Society may also be able to help with the project.

Youths may want to present their research and management plans to other groups. School classes, 4-H clubs, county fairs, and adult sports and service clubs all offer possible audiences for their presentations.

After the youths have completed their projects, ask them to share their results with the group and consider the following questions:

- Do species whose populations are declining have common characteristics?
- What could have been done to prevent the species from becoming endangered, threatened, or of special concern?
- What can be done now?
- What can be done to stop population declines of species that are not yet endangered, threatened, or of special concern?

Activity 3-3: Habitat Diversity

Activity 3-3 helps youths understand the meaning of diversity within a habitat and the relationship between habitat diversity and wildlife diversity. It is necessary to complete **Activity 2-2: Neighborhood Survey** before doing Activity 3-3. Activity 3-3 can be completed indoors.

Ask the youths to look at the data they collected in Activity 2-2 and name (1) the habitat in their community that attracts the most species of wildlife and (2) the habitat that attracts the fewest species of wildlife. Then ask the following questions:

- Why is one habitat likely to have a greater diversity of species than another?
- How do foods, water sources, and nesting sites differ between the two habitats?
- Do both habitats have similar layers of vegetation (trees, shrubs, and ground plants)?
- How do layers of vegetation make the habitat more or less attractive to different species of wildlife?
- What is meant by diversity within a habitat?
- How is diversity within a habitat related to diversity of species?
- Some additional questions to ask are: Is a flower garden a diverse habitat? Is a flower garden a diverse habitat for a bee or a butterfly? Is it a diverse habitat for a bear? Does diversity within a habitat depend on the "viewpoint" of the particular animal being considered?
- Finally, ask the youths which of the habitats they surveyed in Activity 2-2 would be most likely to have the largest number of individual animals (as distinguished from the largest number of species). Some urban areas, for example, have very large populations of a few species, such as pigeons, but the overall diversity of species is low.

Following the discussion, have the youths answer the questions on the Habitat Diversity Activity Record.

Activity 3-4: Diversity from an Insect's Point of View

A habitat that seems uniform to large animals, such as humans or bears, may be very diverse from the viewpoint of a small animal such as an insect. For an insect that spends most of its time on the ground, the variety of ground vegetation and ground surfaces is important. In this activity, youths compare the diversity of insects in several different habitats. They relate their results to differences in diversity among habitats.

Ask the youths to choose a habitat in which they would like to collect insects. Possible habitats include a wooded area, a vacant lot, and a lawn. Ask the youths to predict which habitats will have the largest and smallest numbers of different kinds of insects.

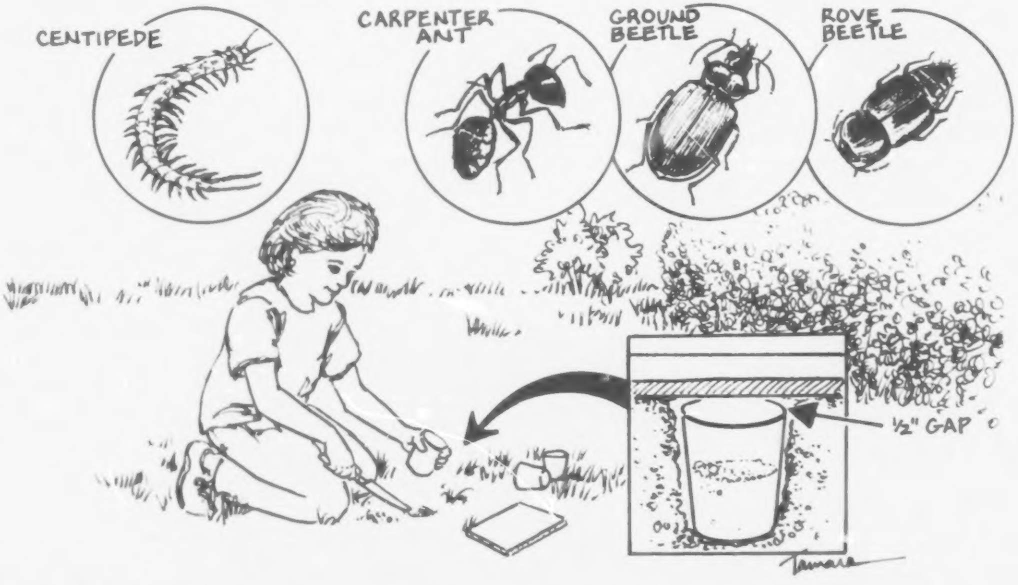
Youths will collect insects that crawl along the ground using pitfall traps. To make a pitfall trap, each youth needs an eight-ounce steep-sided plastic cup; a small square piece of plywood or waxed cardboard large enough to cover the cup, with four 1 ½-inch nails hammered through each corner; a trowel or bulb planter; and soapy water.

Instruct the youths in the following procedure for collecting insects:

In each habitat dig a hole in the ground the size of the eight-ounce cup using the trowel or bulb planter. Place the cup in the hole so the top of the cup is at or near ground level. Fill the cup half-full with soapy water. Set the plywood or cardboard cover over the cup and push the nails into the ground so the distance between the rim of the cup and the cover is about ½ inch (1 ¼ cm); too large a gap will allow mice or shrews to fall into the pitfall trap. Place more than one pitfall trap in each habitat to get a representative sample of the insects living there. Visit the pitfall traps daily to collect the insects and replace the soapy water. Count the number of different kinds of insects. Place similar insects into groups, and either make up a name for each group or use a field guide to identify the insects. (See Appendix III for names of field guides. Caution: identifying insects with field guides can be difficult.)

After the youths have collected insects for several days, involve them in a discussion of insect diversity.

- Which habitat had the largest number of different kinds of insects? Why might this be so? Is this what you predicted?
- Which habitat had the smallest number of different kinds of insects? Why might this be so? Is this what you predicted?
- From an insect's point of view, what makes a habitat diverse?



Insects and other animals walking or crawling along the ground may fall into a pitfall trap.

Activity 3-5: Recording Wildlife Observations in a Field Journal

In this activity, youths observe wildlife and signs of wildlife and carefully record their observations. This activity takes place outdoors.

Even in a very urban setting, youths can observe a few common birds such as pigeons, starlings, and house sparrows. They can also observe what insects and birds are present in a vacant lot. By visiting city parks or suburban neighborhoods, they are likely to see a variety of birds, insects, and mammals (such as squirrels or chipmunks). If the group has access to a pond, they may see ducks, turtles, frogs, and toads. Other possible observations include birds at a feeder and insects under dead leaves and stones, in streams and ponds, and on flowers, leaves, and stems.

Once the youths find wildlife, they can observe specific behaviors. For example, they can watch how an animal hunts or finds food, feeds its young, builds a nest, or courts and mates. Nature guides (see Appendix III) are useful references for learning more about wildlife behavior.

Divide your group into observation teams of no more than two or three people to minimize disturbing wildlife. If possible, have a parent or other adult join each observation team. Ask each team to choose a habitat in which to observe wildlife. Because the daily activity patterns of animals differ, encourage the teams to observe wildlife during different times of the day. Animals also have different seasonal patterns of activity, so observing the same site at different times of the year can yield important information. A site should be observed for at least 20 to 30 minutes at a time.

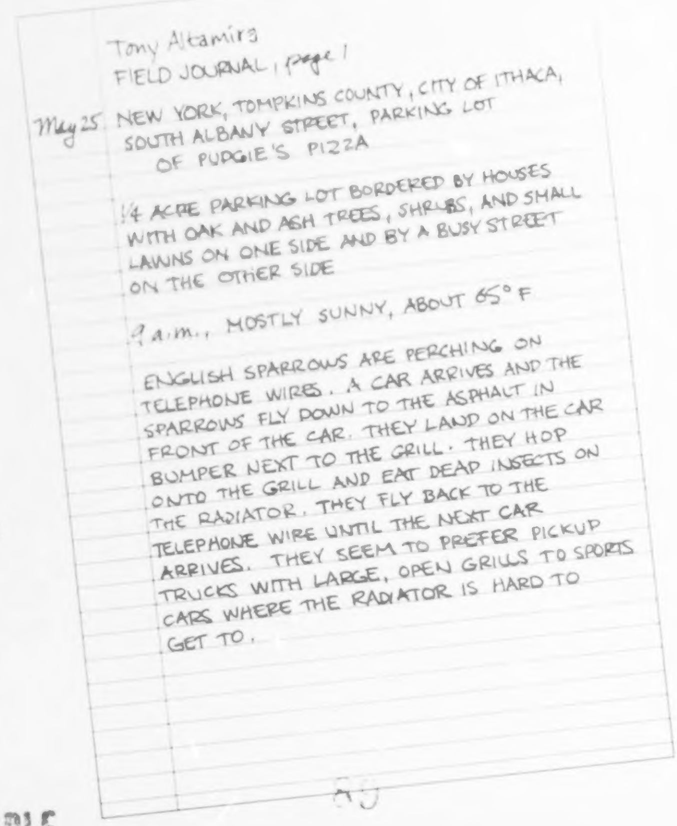
Have the youths also look for signs of wildlife. If they see a bush moving, it is possible there is an animal behind it. Even if they don't see an animal, they may see evidence of an animal, such as tracks and droppings near water or in sand or snow. Chewed branches and nuts are evidence of animals eating, and burrows and dens are signs of nesting. Remind the youths in your group to keep as quiet as possible while observing wildlife. And most of all, encourage them to be patient!

Have the youths record their observations in a field journal. Three-ring binders that hold six- by eight-inch notebook paper are commonly used. Youths can design their own journal, but it should include the information shown on the Field Journal Activity Record. Making accurate observations and recording them in a field journal require skill. Youths who are particularly interested in field journals might want to obtain a copy of *The Naturalist's Field Journal* by Steven G. Herman (see Appendix III).

It is not necessary for the youths to know the names of all the wildlife they observe. By making careful drawings and written records in a field journal, it is often possible to identify a species after returning from the field. The field guides listed in Appendix III will be useful to youths who are interested in learning how to identify wildlife.

After the teams have observed several different sites, have them share their findings. Ask them the following questions:

- What types of wildlife or signs of wildlife did you observe?
- Was there a relationship between the foods and nesting sites available and the number and kinds of wildlife?
- How could your observations aid you in planning your own habitat improvements?



Tony Altamira
FIELD JOURNAL, page 1

May 25 NEW YORK, TOMPKINS COUNTY, CITY OF ITHACA,
SOUTH ALBANY STREET, PARKING LOT
OF PUDGIE'S PIZZA

1/4 ACRE PARKING LOT BORDERED BY HOUSES
WITH OAK AND ASH TREES, SHRUBS, AND SMALL
LAWNS ON ONE SIDE AND BY A BUSY STREET
ON THE OTHER SIDE

9 a.m., MOSTLY SUNNY, ABOUT 65° F

ENGLISH SPARROWS ARE PERCHING ON
TELEPHONE WIRES. A CAR ARRIVES AND THE
SPARROWS FLY DOWN TO THE ASPHALT IN
FRONT OF THE CAR. THEY LAND ON THE CAR
BUMPER NEXT TO THE GRILL. THEY HOP
ONTO THE GRILL AND EAT DEAD INSECTS ON
THE RADIATOR. THEY FLY BACK TO THE
TELEPHONE WIRE UNTIL THE NEXT CAR
ARRIVES. THEY SEEM TO PREFER PICKUP
TRUCKS WITH LARGE, OPEN GRILLS TO SPORTS
CARS WHERE THE RADIATOR IS HARD TO
GET TO.

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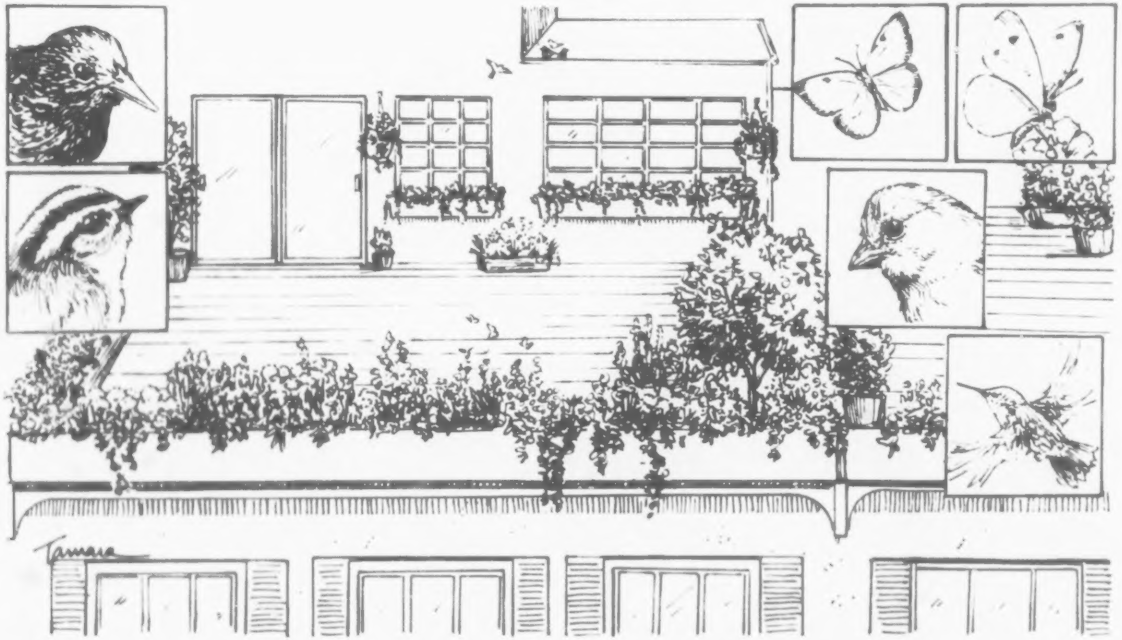
4

Backyard Wildlife: What You Can Do

Nearly three-fourths of the urban and suburban residents of New York State participate in wildlife observation, feeding, and photography and other wildlife-related activities. Studies show that almost all metropolitan residents would like their children to take part in nature programs such as wildlife identification and study. To meet the desires of the urban population of New York, we need to maintain and improve our wildlife resources. There are a number of things we can do to accomplish this goal.

Maintaining and improving wildlife habitats is the key to maintaining and enhancing wildlife diversity. To conserve some wildlife, such as species that require large areas of an intact habitat to survive (area-sensitive species) and species that are threatened or endangered, it is necessary for conservation organizations and federal, state, and local governments to work together to preserve large tracts of wild land and specialized habitats. Other wildlife, such as many birds and butterflies, benefit from habitat improvements in backyards and neighborhoods.

This chapter outlines how you and the youths in your group can develop a small wildlife habitat improvement patch. Habitat improvement patches can be developed on an apartment balcony, in a school yard, in a backyard, in an abandoned lot, or in many other small areas. If your group decides to undertake a habitat improvement project, you may want to contact one of the organizations listed in Appendix I or refer to the list of resources in Appendix III for more specific suggestions on plantings, nestboxes, and other habitat improvements.

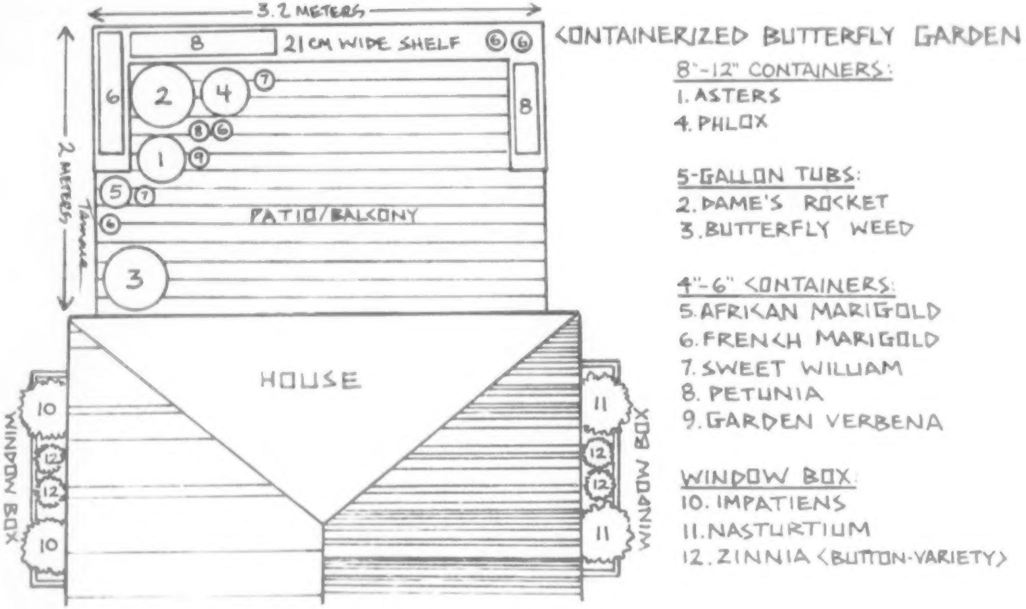


Visitors to an urban wildlife garden could include ***(left to right)*** **a European starling, a golden-crowned kinglet, a clouded sulphur butterfly, a cabbage butterfly, a house finch, and a ruby-throated hummingbird.**

Six activities are included in this chapter to help youths learn about conducting wildlife habitat improvements. Even if your group does not wish to develop a habitat improvement patch, the activities will be useful in teaching the youths about wildlife in their backyards or neighborhoods.

Wildlife Habitat Improvements

Whether youths live in a city apartment or suburban development, they can encourage many species of wildlife to visit their homes. Youths living in apartments can make a containérized butterfly garden by using plants in pots. Those with a yard in the suburbs can add plantings to attract songbirds.

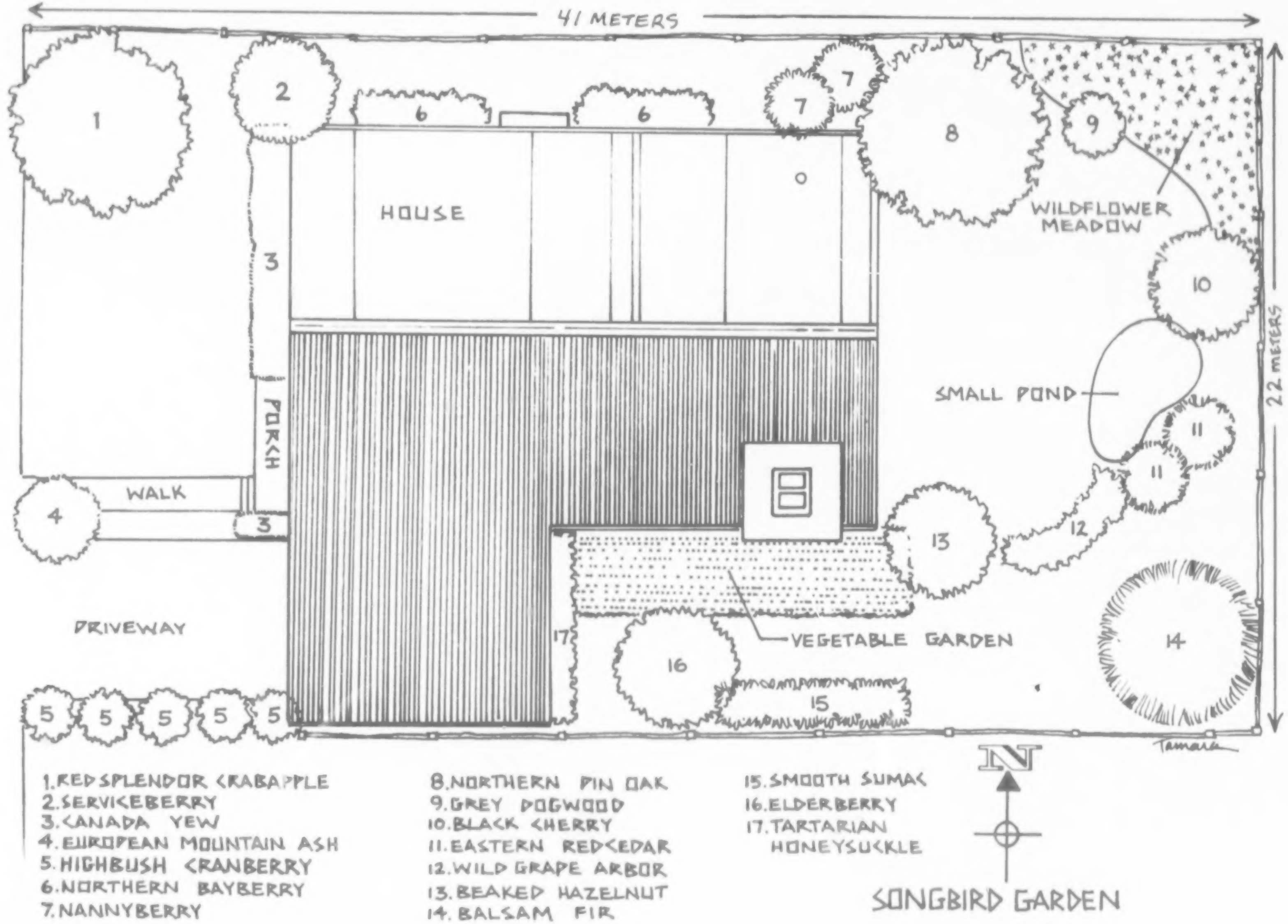

3.2 METERS
2 METERS
8
21 CM WIDE SHELF
6
1
2
3
4
5
7
9
PATIO/BALCONY
HOUSE
WINDOW BOX
10
11
12
CONTAINERIZED BUTTERFLY GARDEN
8"-12" CONTAINERS:
1. ASTERS
4. PHLOX
5-GALLON TUBS:
2. DAME'S ROCKET
3. BUTTERFLY WEED
4"-6" CONTAINERS:
5. AFRICAN MARIGOLD
6. FRENCH MARIGOLD
7. SWEET WILLIAM
8. PETUNIA
9. GARDEN VERBENA
WINDOW BOX:
10. IMPATIENS
11. NASTURTIUM
12. ZINNIA (BUTTON-VARIETY)

Example of a containerized butterfly garden

Discussion Questions

- **What types of wildlife can you expect to attract to a habitat improvement patch in your backyard or school yard or on your balcony?**
- **What types of wildlife will not come to a habitat improvement patch in a suburban or urban area?**

(Hint: The wildlife you attract will depend, in part, on the habitat improvements that you make and on how near you are to an existing habitat where a particular wildlife species is present. You are not likely to attract wildlife that are threatened or endangered or that have very specific habitat requirements.)


41 METERS
22 METERS
SIDEWALK
HOUSE
PORCH
WALK
DRIVEWAY
WILDFLOWER MEADOW
SMALL POND
VEGETABLE GARDEN
1
2
3
3
4
5
5
5
5
5
6
6
7
7
8
9
10
11
11
12
13
14
15
16
17
Tamara
N
1. RED SPLENDOR CRABAPPLE
2. SERVICEBERRY
3. CANADA YEW
4. EUROPEAN MOUNTAIN ASH
5. HIGHBUSH CRANBERRY
6. NORTHERN BAYBERRY
7. NANNYBERRY
8. NORTHERN PIN OAK
9. GREY DOGWOOD
10. BLACK CHERRY
11. EASTERN REDCEDAR
12. WILD GRAPE ARBOR
13. BEAKED HAZELNUT
14. BALSAM FIR
15. SMOOTH SUMAC
16. ELDERBERRY
17. TARTARIAN HONEYSUCKLE
SONGBIRD GARDEN

Example of a songbird garden

Planning, Developing, and Maintaining a Wildlife Habitat Patch

To ensure the success of a wildlife habitat patch, have the youths in your group follow the steps outlined below.

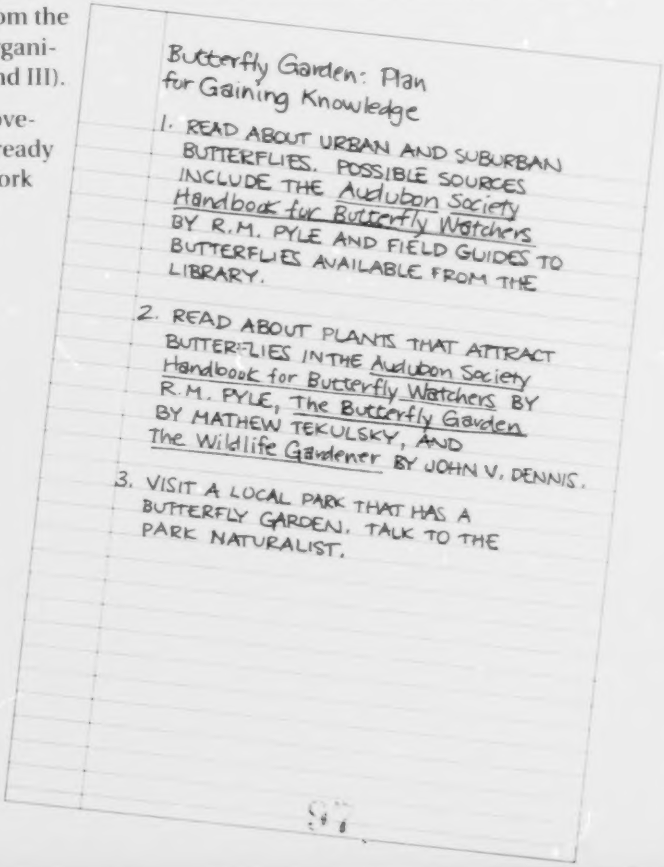
1. **Gain knowledge.**
2. **Choose a site.**
3. **Assess resources.**
4. **Identify species of interest.**
5. **Make improvements.**
6. **Maintain the wildlife habitat patch.**

Suggestions and activities to help the youths in your group complete each step in planning, developing, and maintaining a wildlife habitat patch follow. Encourage the youths to keep a record of this project in a journal.

1. Gain Knowledge

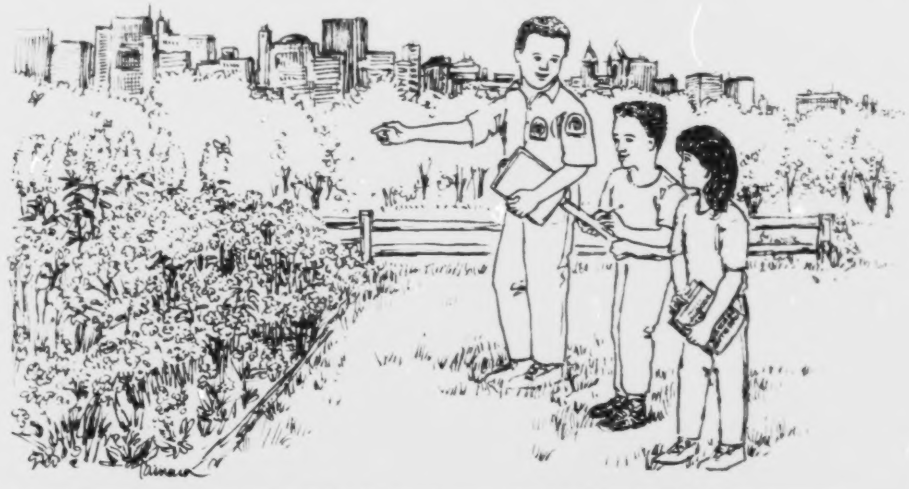
By reading the information and performing the activities presented so far, your group has taken the first step toward creating a habitat patch. They will probably also want to find out more about the wildlife in their neighborhood (see Appendix III for a list of references). For a list of plants that are suitable for wildlife, see the Table of Trees and Shrubs and the Wildlife They Attract in the pocket folder. Your county Cornell Cooperative Extension agent may also have information about the wildlife plants appropriate for your area. Youths can obtain publications about improving habitats from the National Wildlife Federation and other organizations and agencies (see Appendices I and III).

Another way to learn about habitat improvement is to interview someone who has already created a wildlife habitat patch. In New York State, many individuals, businesses, and communities have undertaken efforts to improve wildlife habitats. Programs through the National Wildlife Federation, the National Institute of Urban Wildlife, and the New York State Department of Environmental Conservation encourage landowners to improve wildlife habitats (see Appendix I). People who have participated in these efforts might be willing to share their experiences with your group. Your local Cornell Cooperative Extension agent can help you find the names of such individuals. Many parks and preserves have also undertaken efforts to improve wildlife habitats. Park naturalists can discuss wildlife on park lands.



Butterfly Garden: Plan
for Gaining Knowledge

1. READ ABOUT URBAN AND SUBURBAN BUTTERFLIES. POSSIBLE SOURCES INCLUDE THE Audubon Society Handbook for Butterfly Watchers BY R.M. PYLE AND FIELD GUIDES TO BUTTERFLIES AVAILABLE FROM THE LIBRARY.
2. READ ABOUT PLANTS THAT ATTRACT BUTTERFLIES IN THE Audubon Society Handbook for Butterfly Watchers BY R.M. PYLE, The Butterfly Garden BY MATHEW TEKULSKY, AND The Wildlife Gardener BY JOHN V. DENNIS.
3. VISIT A LOCAL PARK THAT HAS A BUTTERFLY GARDEN. TALK TO THE PARK NATURALIST.



A park naturalist may be able to talk with your group about wildlife habitat improvements.

Activity 4-1:

Interviewing People Who Have Made Habitat Improvements

This activity provides guidelines for conducting interviews so youths can learn more about habitat improvement.

Ask the youths to break up into several small teams to conduct separate interviews, or have the entire group interview one or more landowners. Once the youths have decided whom to interview, have them prepare a list of interview questions. Sample questions are included on the Interview Activity Record, but the youths may want to generate their own list of questions. Remind them that the purpose of the interview is not only to learn about what others have done, but also to gather useful information for planning their own wildlife habitat improvement projects.

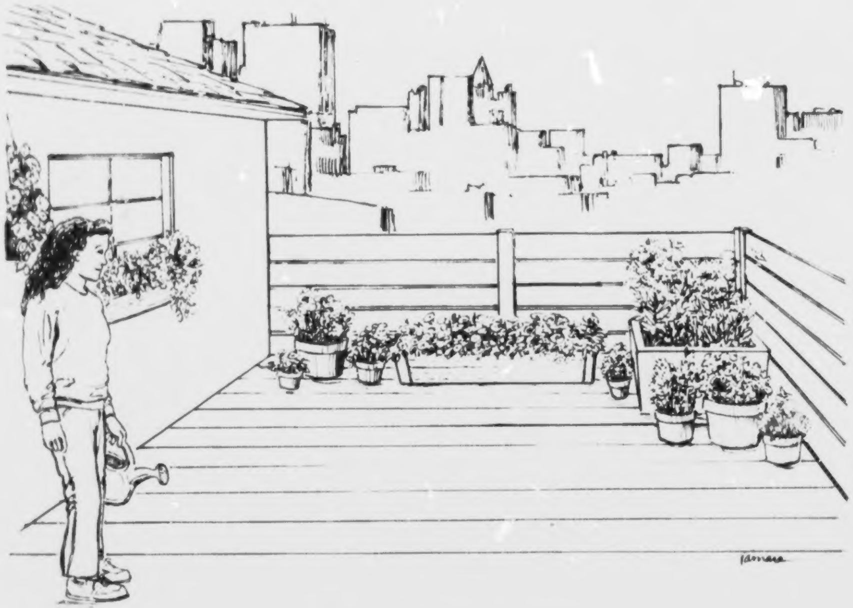
Allow time to discuss the results of the interview. Focus the discussion by asking the following questions:

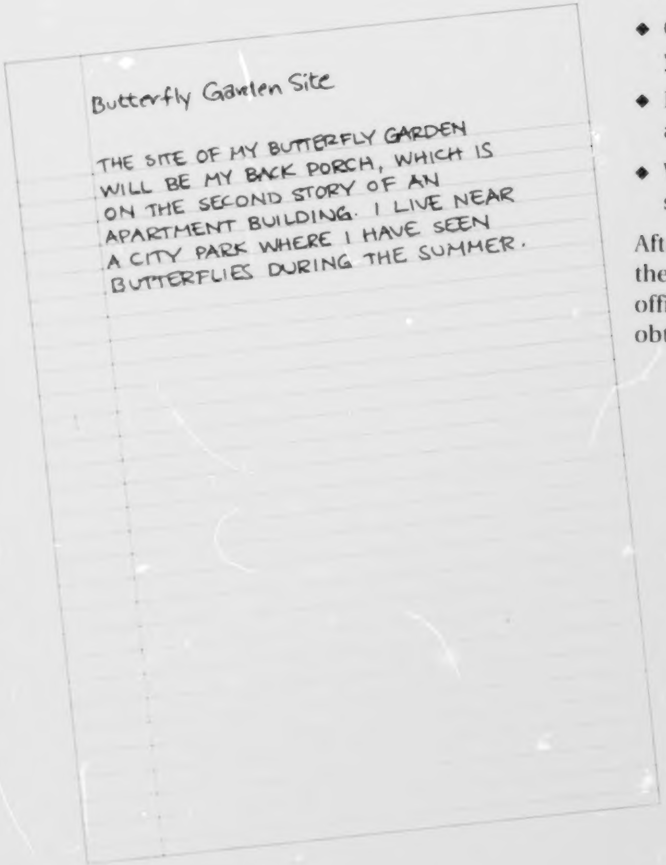
- How did the landowner increase the food sources and nesting sites available to wildlife?
- How did the landowner increase plant diversity?
- Did the improvements result in an increase in wildlife diversity?

Have the youths write a thank-you note to the landowner soon after the interview.

2. Choose a Site

For many youths, the site they choose as their habitat improvement patch will be their backyard. But for those who live in apartments, who have already improved their backyard for wildlife, or who for some other reason do not plan a backyard habitat patch, there are other options. Containerized wildlife gardens can be planted on the balconies or roofs of apartment buildings, provided the buildings are structurally sound and the landlord gives permission. Other possibilities include working with a local school to improve part of the school yard, getting permission from a local government to improve a vacant lot, or working with a parks department to develop part of a park. **Activity 4-2: Choosing a Habitat Patch** provides youths with guidelines for accomplishing this step.





Butterfly Garden Site

THE SITE OF MY BUTTERFLY GARDEN WILL BE MY BACK PORCH, WHICH IS ON THE SECOND STORY OF AN APARTMENT BUILDING. I LIVE NEAR A CITY PARK WHERE I HAVE SEEN BUTTERFLIES DURING THE SUMMER.

Activity 4-2:

Choosing a Habitat Patch

Youths can complete this activity working as a group on one site or individually on their own sites. They should visit the sites they have in mind. After they have completed the Choosing a Habitat Patch Activity Record, discuss with them the following questions:

- Can you get permission to work on the site you chose? How?
- Is the site near areas where wildlife are already present? Why is this important?
- Will it be convenient for you to maintain this site once you make the improvements?

After you have discussed these questions, help the youths write letters or otherwise contact officials, parks departments, or parents to obtain permission to use a particular site.

3. Assess Resources

Once a site is chosen, the next step is to assess the current quality of the site for wildlife and their use of it. The youths in your group should repeat **Activity 2-2: Neighborhood Survey**, **Activity 3-3: Habitat Diversity**, and **Activity 3-5: Recording Wildlife Observations in a Field Journal** to assess the current resources of their sites. In addition, they should draw maps of their sites. Guidelines for drawing a map are in **Activity 4-3: Mapping Your Wildlife Habitat Improvement Site**. After they complete their maps, have them fill out the Assessing Your Resources Activity Record.

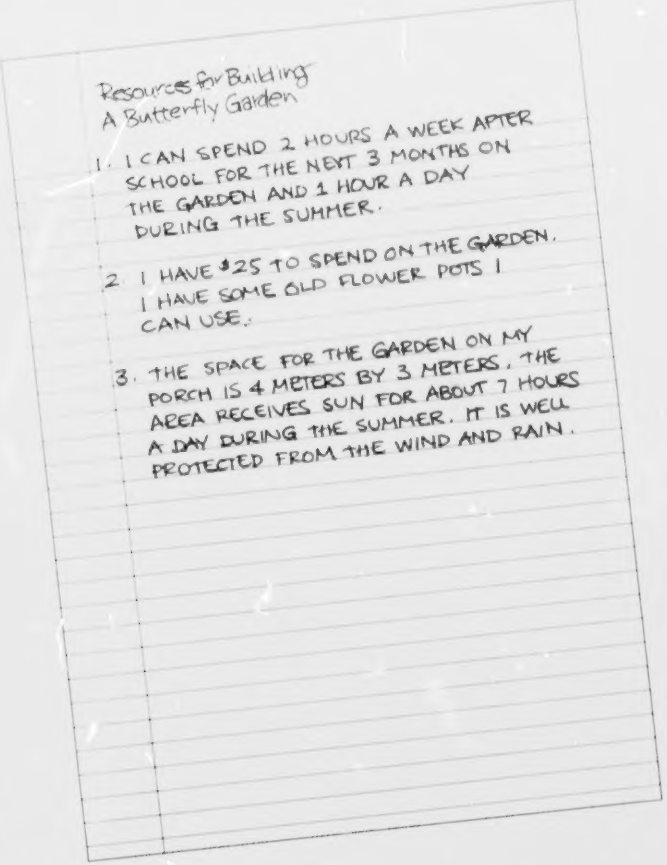
The youths in your group will also need information about soil drainage, soil nutrient levels, and exposure to the sun on their sites. Your county Cornell Cooperative Extension agent can provide guidelines for analyzing the soil. Youths can determine the hours that plants in their habitat patch will be exposed to the sun by observing the daily patterns of sunlight and examining surrounding buildings and vegetation.

Once they have completed a map and an assessment of the resources, the youths should have a good idea of the foods and nesting sites available. The next step is to decide what additional resources they have for making habitat improvements by answering the following questions:

- How much time do you have to develop and maintain your wildlife habitat? Can others help?
- How much money do you have for your wildlife habitat project?
- Are plants available at low or no cost?

In the spring, youths can get plants through the New York State Department of Environmental Conservation. Have them call the local office and inquire about the Wildlife Habitat Improvement Packets for urban areas. If youths are working on public lands or if a 4-H, scout, or school group is involved in the project, local greenhouses or nurseries may donate plants.

After the youths have assessed their resources and completed the Assessing Your Resources Activity Record, have them share their findings. Be sure to ask them how much time they are willing to devote to the habitat improvement patch.



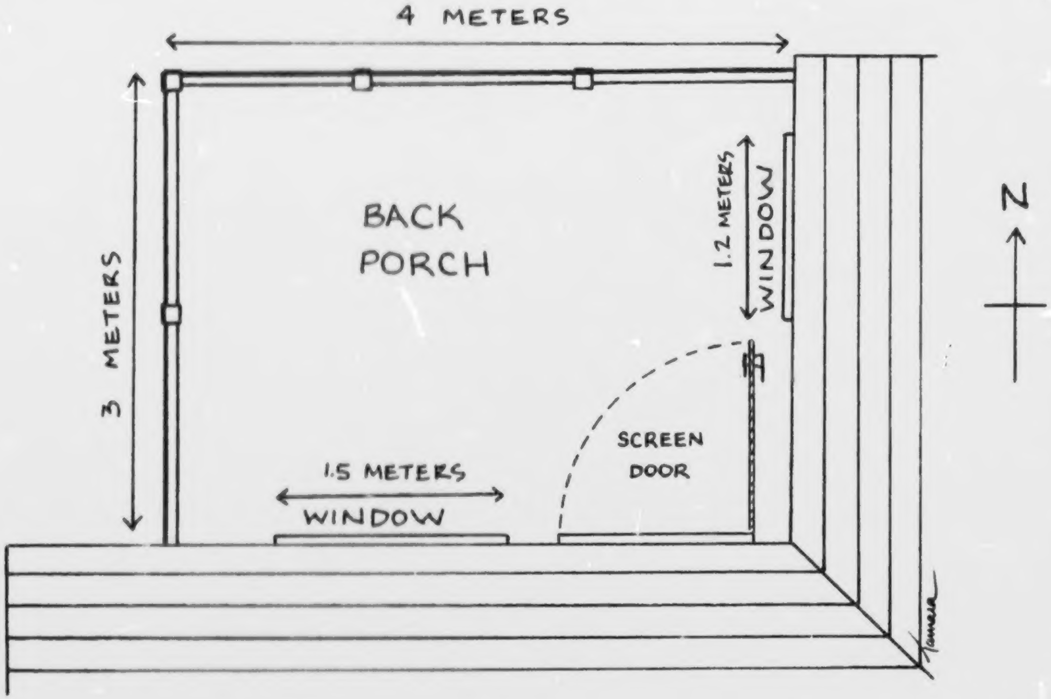
Resources for Building
A Butterfly Garden

1. I CAN SPEND 2 HOURS A WEEK AFTER SCHOOL FOR THE NEXT 3 MONTHS ON THE GARDEN AND 1 HOUR A DAY DURING THE SUMMER.

2. I HAVE $25 TO SPEND ON THE GARDEN. I HAVE SOME OLD FLOWER POTS I CAN USE.

3. THE SPACE FOR THE GARDEN ON MY PORCH IS 4 METERS BY 3 METERS. THE AREA RECEIVES SUN FOR ABOUT 7 HOURS A DAY DURING THE SUMMER. IT IS WELL PROTECTED FROM THE WIND AND RAIN.

MY BUTTERFLY GARDEN SITE



Activity 4-3:

Mapping Your Wildlife Habitat Improvement Site

Youths need plain or graph paper, a 25-foot tape measure, and 3 or 4 sheets of clear acetate plastic to complete this activity. On large sites, they may also need a compass.

First, they will draw a base map with the boundaries of their area and all the permanent structures. Then, using clear sheets of acetate plastic, they will map the existing vegetation, their plans for improvements, the changes in vegetation over the years, and even the location of wildlife that visit their site. Photocopy the following instructions for making a base map and overlays and give them to the youths.

Instructions for Making a Base Map and Overlays

1. If you are working in a small area such as a balcony, you will be able to use a measuring tape to map your site. On larger sites, use your pace to approximate distances and dimensions. To determine your pace, measure and mark a 25-foot distance on the ground. Walk from the beginning to the end of the 25-foot distance and then back, counting the number of paces taken. (A pace is one step with the right foot and then one step with the left foot.) The length of your pace will be equal to the distance you walked—50 feet—divided by the number of paces taken. (For example, if the number of paces is 20, the length of your pace is 50 divided by 20, or 2 1/2 feet.)
2. Determine the dimensions of the area to be mapped by measuring or pacing the length of the borders.
3. On large sites, use a compass to determine the direction of north.
4. Use a piece of graph paper or a blank sheet of paper to draw your map. Determine the scale of your map, making sure that the entire area will fit on the sheet of paper.

   To determine the scale, divide the longest dimension of the area to be mapped by the number of squares or number of inches or centimeters along the long border of the piece of paper. You may want to leave several squares or inches of border. For example, if the area is 100 feet long and there are 30 squares on the long paper edge, leave a 5-square border at the top. That leaves 25 squares for the map. Since 100 divided by 25 equals 4, each square on the map represents 4 feet on the ground. Next see if there are enough squares or inches along the width of the paper for the shorter dimension of your area. You may have to change the scale, for example, to 1 square equals 5 feet, if the shorter dimension does not fit on the paper.
5. Sketch in the boundaries of your habitat patch on the map. At the top of your map, draw an arrow pointing north.
6. If necessary, use the compass to determine the direction of permanent structures (such as railings, buildings, and driveways) from the boundary of your area. Measure or pace off the distance from the area edge to the structure and the boundaries of the structure. Sketch in the structures on your map.
7. Place a clear sheet of acetate plastic over your map. Using the compass and measurements or pacings to determine locations, sketch in plants and other nonpermanent features such as bird houses and wet areas. Use symbols to identify particular plants. Make sure to label the symbols.
8. Save the additional sheets of acetate plastic to sketch in your plans for improving the habitat patch (Activity 4-5).

4. Identify Species of Interest

Once the youths have chosen a site and know what resources they have, they should decide what species of wildlife they wish to attract. Explain to the youths that they will only be able to attract some kinds of wildlife, depending on their site. If their site is close to a park, they can expect a greater diversity of species than if it is in a highly developed area. If space is limited, they may want to consider a garden for butterflies and hummingbirds. In suburban yards, they may decide to attract songbirds, woodpeckers, and cottontail rabbits.

Once youths have chosen the species they wish to attract, they should determine the specific food, water, and nesting needs of their species. In the pocket folder is a table listing many different trees and shrubs and the wildlife species they attract. **Activity 4-4: Wildlife Needs** provides guidelines for researching the needs of the species chosen.

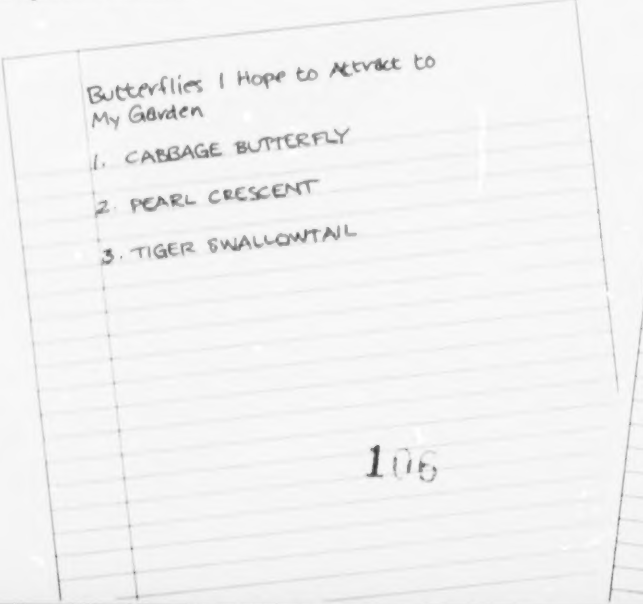
A FIELD GUIDE to the INSECTS
A FIELD GUIDE to the INSECTS
CATERPILLARS
PLANTS
Tamara

Activity 4-4: Wildlife Needs

Have each youth or group identify one or more species they wish to attract. Then have the youths answer the questions on the Wildlife Needs Activity Record. You may need to suggest resources for them to use in answering the questions. See Appendix III for a list of resources.

After the youths have completed the Wildlife Needs Activity Record, ask them the following questions:

- Will you be able to supply the food and water this species needs? How?
- Will you be able to supply the nesting sites this species needs? How?
- Are individuals of the species you chose likely to find your habitat improvement site?



Butterflies I Hope to Attract to My Garden

1. CABBAGE BUTTERFLY
2. PEARL CRESCENT
3. TIGER SWALLOWTAIL

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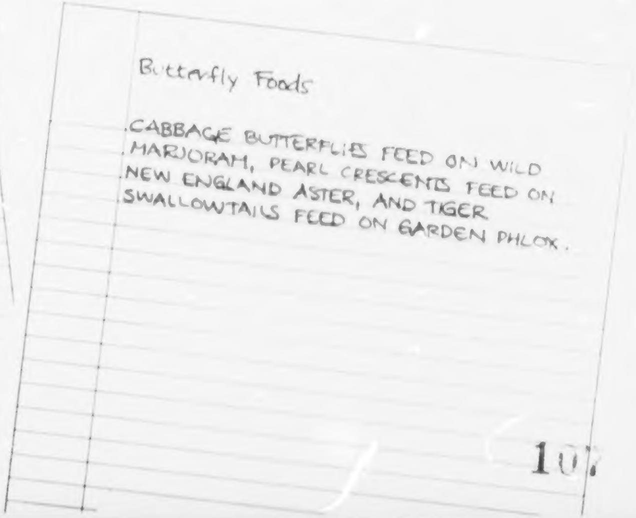

Butterfly Foods

CABBAGE BUTTERFLIES FEED ON WILD MARJORAM, PEARL CRESCENTS FEED ON NEW ENGLAND ASTER, AND TIGER SWALLOWTAILS FEED ON GARDEN PHLOX.

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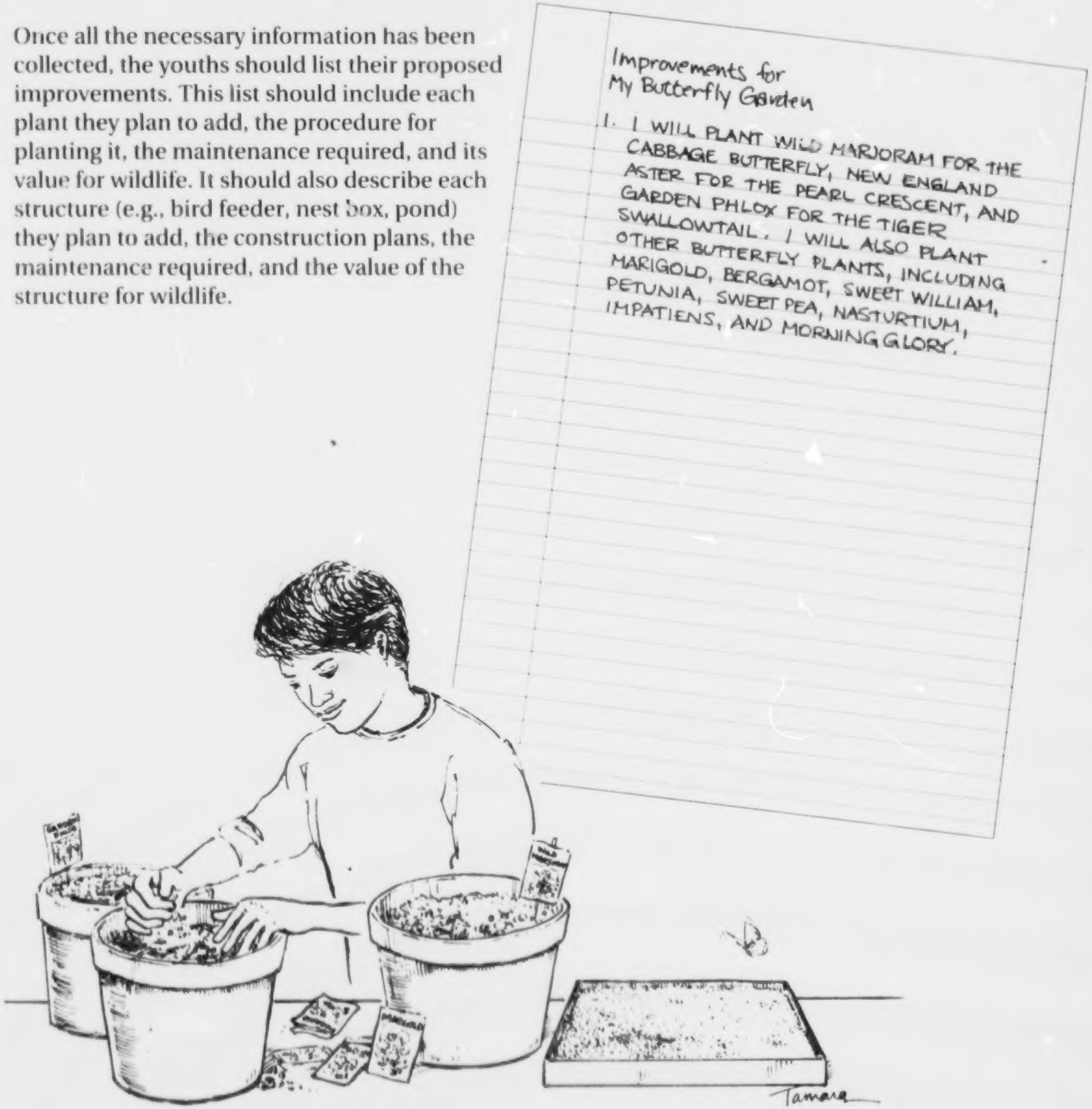
5. Make Improvements

At this point, the youths in your group need to decide what improvements they wish to make and where they will put them. Have them use the information they already have about plants that are suitable for the area and the needs of the wildlife they wish to attract. Your county Cornell Cooperative Extension agent can help answer questions the youths have about their plan. A Department of Environmental Conservation forester may also be able to help. Let these people know what land, time, and financial resources the youths have available for the project.

In developing a habitat improvement plan, it is important to keep several factors in mind. First, the plan should include adding a variety of plants. Ideally, the habitat should have plants that fruit at different times to ensure food sources throughout the year. Plants that vary in height and form provide several types of nesting sites. If water is not available on or near the site, youths should include in their plan an artificial water source.

It is also very important to consider the amount of time available to maintain a habitat patch. If time is limited, youths should choose plants that require low maintenance. Have them consider using native plants whenever possible, because they generally require less maintenance than non-native plants. In addition, some non-native species may escape from the garden and become pests. Also, encourage youths to choose plants that require little watering.

Once all the necessary information has been collected, the youths should list their proposed improvements. This list should include each plant they plan to add, the procedure for planting it, the maintenance required, and its value for wildlife. It should also describe each structure (e.g., bird feeder, nest box, pond) they plan to add, the construction plans, the maintenance required, and the value of the structure for wildlife.



Improvements for
My Butterfly Garden

1. I WILL PLANT WILD MARJORAM FOR THE CABBAGE BUTTERFLY, NEW ENGLAND ASTER FOR THE PEARL CRESCENT, AND GARDEN PHLOX FOR THE TIGER SWALLOWTAIL. I WILL ALSO PLANT OTHER BUTTERFLY PLANTS, INCLUDING MARIGOLD, BERGAMOT, SWEET WILLIAM, PETUNIA, SWEET PEA, NASTURTIUM, IMPATIENS, AND MORNING GLORY.

Planting seeds and putting out a container of damp sand to attract butterflies

Activity 4-5: Making the Improvements

The youths should prepare an exact plan before they make the habitat improvements. Have them answer the questions on the Making the Improvements Activity Record. Then, if more than one person is involved in improving a particular site, have the group assign each person one or more improvement tasks. These could include obtaining equipment and plants, building structures, and planting.

After they complete the Making the Improvements Activity Record, have the youths draw a new map on one of the acetate plastic overlays showing the locations of the planned improvements. (See **Activity 4-3: Mapping Your Wildlife Habitat Improvement Site.**)

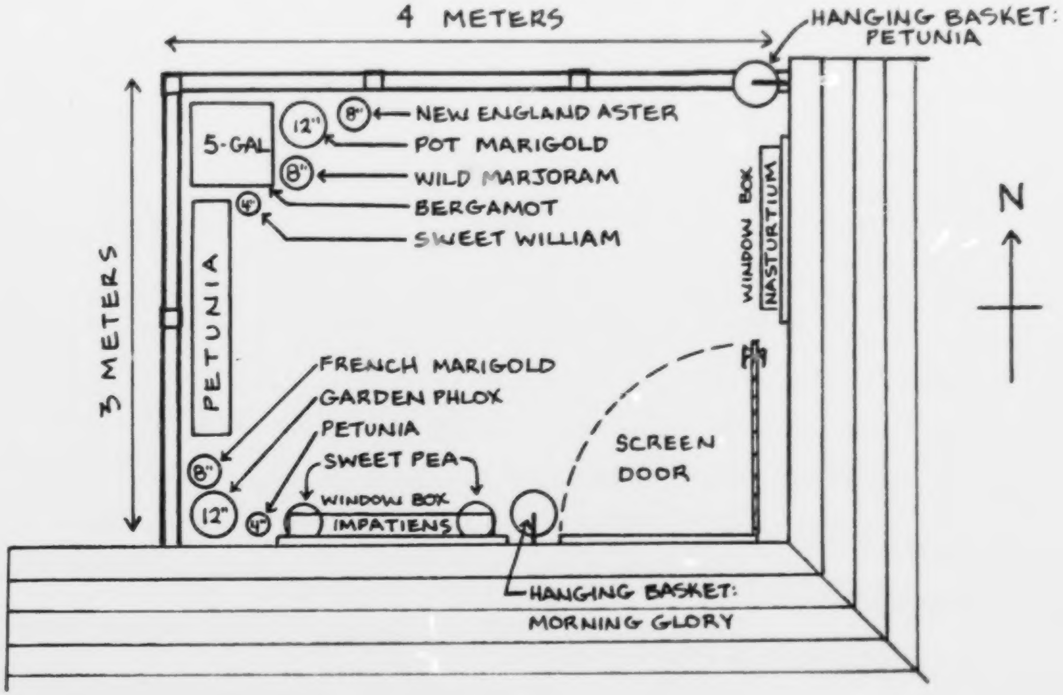
Discuss with the youths their plans for adding plants and structures. Make sure their plans are realistic for their sites and for the time and money they have available for the project. Offer them ideas about how to obtain the needed improvements inexpensively or through donations.

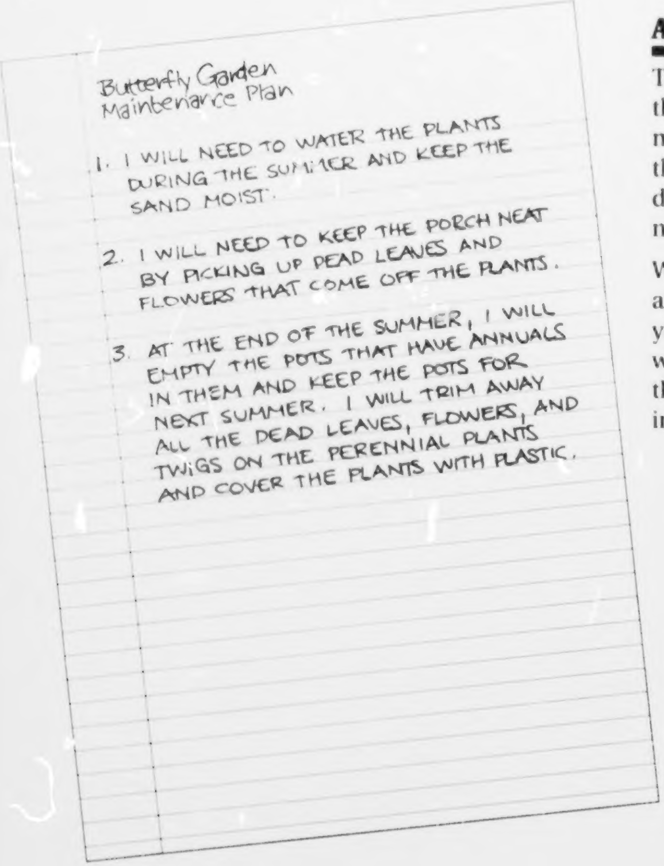
6. Maintain the Wildlife Habitat Patch

Regardless of which plants the youths choose, some maintenance will be necessary and should be included in their planning. New plantings must be watered regularly during the first year to help them become established. Polyethylene plastic and a 4- to 6-inch (10- to 15-cm) layer of shredded bark mulch will keep down weeds around new plantings and keep roots moist.

Artificial structures must also be maintained. To avoid transmitting diseases, bird feeders should occasionally be cleaned with a solution of chlorine bleach and water, then rinsed thoroughly. Nest boxes must also be cleaned out after the breeding season to get rid of parasites and disease-carrying species. Water levels and water quality in bird baths and ponds must be monitored.

Each youth or group should develop a maintenance plan for their habitat patch. They should factor into their plan how much time they have, how much money they will need, and whether other people can help them. If the habitat patch is in a school yard or vacant lot, perhaps future classes or 4-H clubs will be able to maintain it.


4 METERS
HANGING BASKET: PETUNIA
3 METERS
5-GAL
12"
8"
8"
4"
NEW ENGLAND ASTER
POT MARIGOLD
WILD MARJORAM
BERGAMOT
SWEET WILLIAM
PETUNIA
WINDOW BOX
NASTURTIUM
N
FRENCH MARIGOLD
GARDEN PHLOX
PETUNIA
SWEET PEA
8"
12"
4"
WINDOW BOX
IMPATIENS
SCREEN DOOR
HANGING BASKET: MORNING GLORY



Butterfly Garden
Maintenance Plan

1. I WILL NEED TO WATER THE PLANTS DURING THE SUMMER AND KEEP THE SAND MOIST.

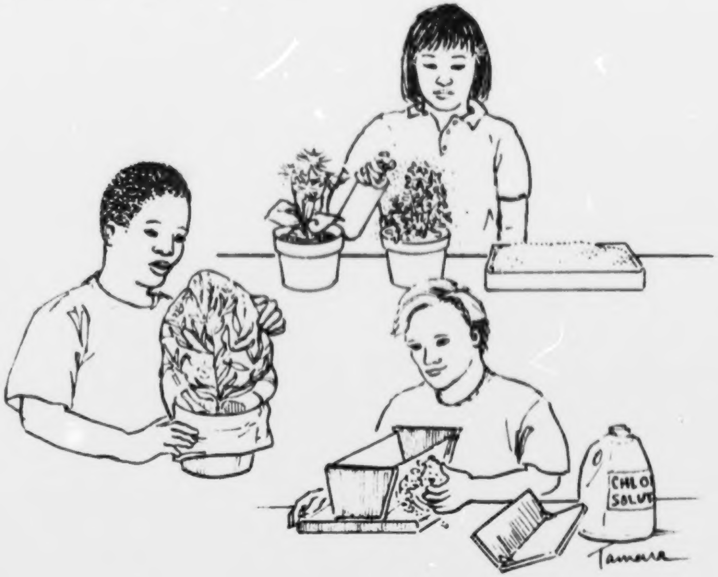
2. I WILL NEED TO KEEP THE PORCH NEAT BY PICKING UP DEAD LEAVES AND FLOWERS THAT COME OFF THE PLANTS.

3. AT THE END OF THE SUMMER, I WILL EMPTY THE POTS THAT HAVE ANNUALS IN THEM AND KEEP THE POTS FOR NEXT SUMMER. I WILL TRIM AWAY ALL THE DEAD LEAVES, FLOWERS, AND TWIGS ON THE PERENNIAL PLANTS AND COVER THE PLANTS WITH PLASTIC.

Activity 4-6: Maintenance Plan

The last step before the youths start making their habitat improvements is developing a maintenance plan. Have the youths complete the Maintenance Plan Activity Record and then discuss who will be responsible for each maintenance task.

When the planning is done, it is time to go out and improve a habitat patch! Remind the youths in your group that it may be a lot of work, but the rewards are many. If all goes well, they can look forward to many hours of observing and learning about wildlife.

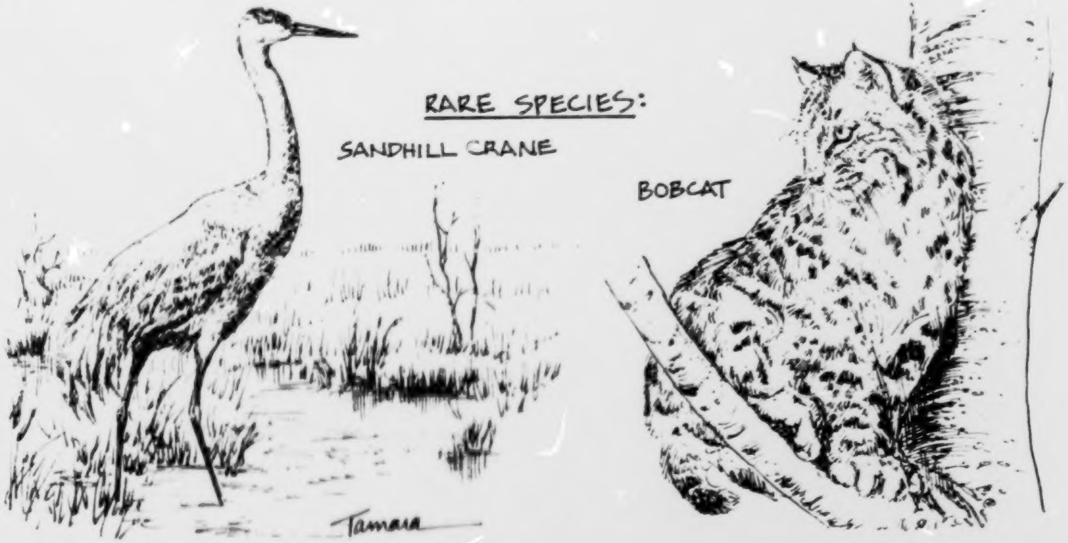


Maintaining a wildlife garden can include watering plants, covering plants in cold weather, and cleaning feeders with a solution of chlorine bleach.

5

Rare Wildlife Species: What You Can Do

Creating a habitat patch in your backyard or on your apartment balcony can benefit many wildlife species. Some wildlife, however, have requirements that cannot be met in a backyard or rooftop garden. For example, area-sensitive birds need large expanses of undisturbed forest. Many endangered species, such as the Karner blue butterfly, require very specific habitats. What can you do to help rare wildlife species?



Sandhill cranes and bobcats are rare in New York State but are not officially listed as endangered, threatened, or of special concern.

Encourage youths who get involved in protecting threatened and endangered species to keep a journal. Also refer youths to **Activity 3-2: Rare Wildlife Species**. **Activity 5-1: Local Wildlife Issues** involves youths in learning about controversies surrounding wildlife in their communities.

Become Knowledgeable

Probably the most important step you can take is to become knowledgeable about wildlife and wildlife habitats. There are many opportunities for informed individuals to assist with the efforts of government agencies, universities, and conservation groups to protect wildlife. For example, you can participate in surveys to monitor bird populations, or speak out in support of legislation that protects endangered species. People aware of wildlife ecology can act responsibly and not disturb sensitive wildlife species. They can use their knowledge to educate others, including youths in their community.

Educate yourself about wildlife and about threatened and endangered species. Pass on your knowledge to others.

Participate in Bird Surveys

By monitoring wildlife populations, biologists can tell which species are declining in number and need special protection. The Cornell Laboratory of Ornithology conducts several bird population monitoring programs that depend on the efforts of knowledgeable volunteers. These include Project Feeder Watch and the Nest Record Program. Other volunteer monitoring programs include the annual Christmas Bird Count sponsored by the National Audubon Society and the breeding bird surveys conducted by the United States Fish and Wildlife Services.

Support the Efforts of Federal and State Agencies

One of the most important things you can do as a citizen is to support and encourage the efforts of state and federal governments to protect threatened and endangered species. When an issue concerning wildlife protection comes before the legislature, educate yourself and speak out in its favor. Keep in touch with your state and federal legislators. Write them letters, asking them to support bills for the protection of wildlife and commending their efforts in support of threatened and endangered species.

Remember that you cannot just protect a species; you must also protect the habitat that allows the species to survive. Protecting habitats may mean limiting development in sensitive areas such as wetlands and open beaches. Most importantly, remember that it is essential to protect wildlife species and their habitats before they become endangered.

Support Conservation Organizations

You may wish to support conservation organizations that protect wildlife and wildlife habitats. You can even get involved in volunteer activities of organizations such as the National Audubon Society, The Nature Conservancy, and the National Wildlife Federation. See Appendix II for a list of organizations that sponsor programs for threatened and endangered species.

World Wildlife Fund

WWF

Bat Conservation International, Inc.

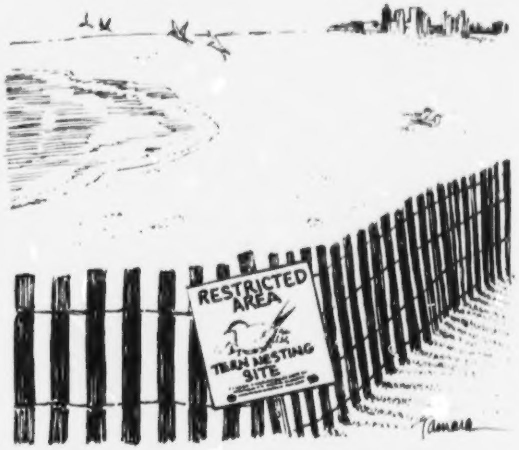
NATIONAL WILDLIFE FEDERATION

Cornell Laboratory of Ornithology

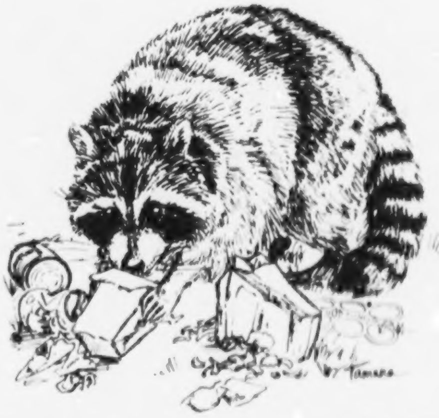
Join and support organizations that are actively working to preserve habitats for threatened and endangered species.

Act in a Responsible Manner

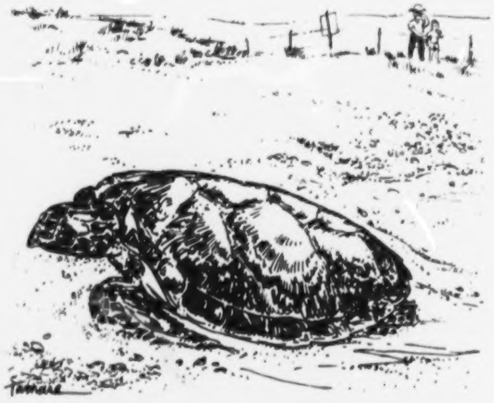
When you are in an area where access has been restricted because of wildlife nesting, follow the rules posted and encourage others to do so. Stay away from nesting areas. Even if you are not trampling nests, your presence may interrupt feeding and breeding behaviors. Do not leave garbage, which may attract species that compete for nesting sites or prey on threatened and endangered species. When you demonstrate responsible behavior, you serve as a role model for others around you, including youths.



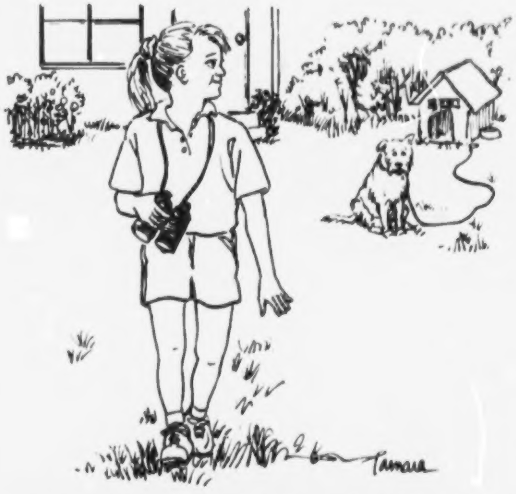
Respect all areas fenced or posted for the protection of wildlife.



Do not leave or bury trash. Garbage attracts wildlife that prey on threatened and endangered species or that compete with them for nesting sites.



Do not approach or linger near threatened and endangered species or their nesting sites.



Leave your pets at home or keep them leashed when you visit the habitats of threatened and endangered species.

Activity 5-1: Local Wildlife Issues

Many controversies surrounding development projects focus on rare wildlife species, or at least on species that are becoming rare in the community where the development is proposed. Examples of such projects include opening a stretch of beach to motorized vehicles, building homes in a wetland, or cutting down a forest to build a shopping mall.

Have the youths choose a local or regional development issue to investigate and debate. Then have the youths draw up a plan for learning about that issue. They could visit a proposed development site and assess its value for wildlife, following the guidelines in **Activity 2-2: Neighborhood Survey**. They could invite people representing both sides of a development controversy to speak to their class or club. They could research the wildlife that would be impacted by a development, attend public hearings and meetings of environmental groups, and write letters to local officials and newspapers.

Have the youths complete the Local Wildlife Issues Activity Record, and then discuss with them the following questions:

- What sources of information helped you most in learning about the proposed development project?
- What sources most influenced your position on how to resolve the development project controversy?
- How might the parties involved work to resolve the controversy?
- What solution do you favor?
- What impact will that solution have on wildlife?

Discussion Question

- **What can we do, as individuals and as a group, to help rare and endangered wildlife species?**

Glossary

area-sensitive species: Species that require large areas of intact habitat to survive; generally refers to songbirds in forested habitats.

aquatic: Living in water.

breeding bird: A bird that reproduces in an area, as opposed to birds migrating or passing through an area.

captive rearing program: A program to raise animals in captivity for releasing into the wild or to perpetuate the species.

carnivore: An animal that depends on other animals for the major part of its diet.

cavity: In this guide, a hole in a tree.

colonial waterbird: A bird that nests in a dense group along a large body of water.

detritivore: A scavenger, or an animal that eats dead and decaying plants and animals.

diversity: 1. The number of different species of animals or plants within a particular habitat. 2. In a more general sense, variety, such as habitats, layers of vegetation, or ground surfaces.

edge: In this guide, an area where two distinct plant communities come together, such as abandoned fields and aspen thickets, or overgrown orchards and maple-beech forests.

endangered species: Plants and animals that are in danger of extinction.

Endangered Species Act: An act passed by Congress in 1973 to provide protection for threatened and endangered plant and animal species.

forest fragment: A small area of a once large forest that is surrounded by agricultural and (or) urban development.

forest island: A forest fragment.

frugivore: An animal that depends on fruit for the major part of its diet.

granivore: An animal that depends on grains or seeds for the major part of its diet.

guild: A group of wildlife species that depend on similar food resources or nesting sites, such as the carnivorous guild and the cliff-nesting guild.

habitat: The physical and biological environment in which an individual plant or animal lives. For wildlife, habitat includes such things as the plants, ponds, and buildings (or other structures) that provide the food, water, and nesting sites necessary for survival.

herbivore: An animal that depends on plants for the major part of its diet.

individual: One member of a species.

insectivore: An animal that depends on insects for the major part of its diet.

introduced species: An animal or plant species that is not native to a particular area but which has been brought there by humans.

invertebrate: An animal without a backbone, such as insects, spiders, and lobsters.

nectarivore: An animal that depends on nectar for the major part of its diet.

nestling: A young bird still not able to leave the nest.

omnivore: An animal that eats a variety of different foods.

parasite: An animal that depends on another animal for survival to the detriment of the host animal.

pitfall trap: A trap used to catch insects and other invertebrates that crawl along the ground; consists of a liquid-filled cup placed into the ground with a slightly elevated cover.

population: A group of individuals of one species.

semiaquatic: A species spending part of its life in water.

species: A group of animals or plants that resemble each other and that are able to breed among themselves.

species of special concern: Species whose populations may become threatened. This category is identified in New York State, but not by federal legislation.

threatened species: Plants and animals that may soon become endangered.

Appendix I. Wildlife Habitat Improvement Programs

The National Wildlife Federation Backyard Wildlife Habitat Program was started in 1973 to acknowledge the efforts of people who garden for wildlife around their homes—in sites ranging from small city gardens to large suburban lots. The Gardening with Wildlife Kit includes planning tools and informative publications about wildlife habitat enhancement. A certification program is available for wildlife enhancement projects that meet certain criteria. For more information, write to

Backyard Wildlife Habitat
Department BHI
National Wildlife Federation
1400 Sixteenth Street, N.W.
Washington, DC 20036-2266

The National Institute for Urban Wildlife conducts an Urban Wildlife Sanctuary Program. The objectives of this program are "to enhance urban wildlife habitat, promote an appreciation and understanding of urban wildlife and their habitat needs, and give recognition to private and public landowners who dedicate their properties to wildlife uses." Along with a certification program, there is a series of helpful publications. For more information, write to

National Institute for Urban Wildlife
10921 Trotting Ridge Way
Columbia, MD 21044

The New York State Department of Environmental Conservation Urban Wildlife Program conducts a Wildlife Habitat Improvement Program. Through this program, interested individuals may obtain a Wildlife Habitat Improvement Packet (WHIP) which includes seedlings suitable for urban areas and selected specifically to attract songbirds. Contact your local Department of Environmental Conservation office and ask for this packet.

Appendix II. Organizations That Aid Threatened and Endangered Species

Animal Welfare Institute
P.O. Box 3650
Washington, DC 20007

Bat Conservation International, Inc.
P.O. Box 162603
Austin, TX 78716-2603

Cornell Laboratory of Ornithology
159 Sapsucker Woods Road
Ithaca, NY 14850

Defenders of Wildlife
1244 19th Street, N.W.
Washington, DC 20036

The Fund for Animals, Inc.
200 W. 57th Street
New York, NY 10019

International Council for Bird Preservation
c/o WWF-US
1250 24th Street, N.W.
Washington, DC 20037

International Union for Conservation
of Nature and Natural Resources
Avenue du Mont-Blanc
CH-1196 Gland
Switzerland

Long Island Colonial Waterbird Association
NYS Department of Environmental
Conservation
Building 40
SUNY Stony Brook
Stony Brook, NY 11794

National Audubon Society
950 3d Avenue
New York, NY 10022

National Wildlife Federation
1400 16th Street, N.W.
Washington, DC 20036-2266

The Nature Conservancy
1815 North Lynn Street
Arlington, VA 22209

NYS Department of Environmental
Conservation
Endangered Species Unit
Delmar, NY 12054

The Peregrine Fund, Inc.
5666 West Flying Hawk Lane
Boise, ID 83709

Sierra Club
730 Polk Street
San Francisco, CA 94109
or
408 C Street, N.E.
Washington, DC 20002

U.S. Fish and Wildlife Service
18th and C Streets, N.W.
Washington, DC 20240

Wildlife Conservation International
New York Zoological Society
185th Street and S Boulevard, Building A
Bronx, NY 10460

Wildlife Preservation Trust International, Inc.
34th Street and Girard Avenue
Philadelphia, PA 19104

World Wildlife Fund-U.S.
1250 24th Street, N.W.
Washington, DC 20037

The Xerces Society
10 S.W. Ash Street
Portland, OR 97204

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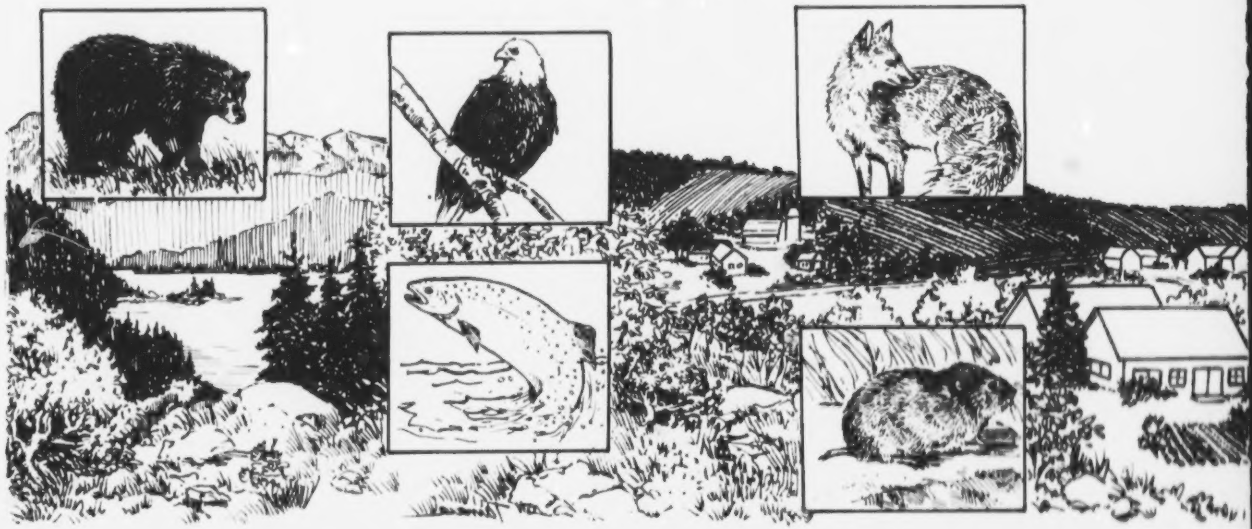

List of Endangered and Threatened Species and Species of Special Concern for New York State

Endangered Species

Chittenango ovate amber snail**
Karner blue butterfly
Shortnose sturgeon*
Round whitefish
Pugnose shiner
Eastern sand darter
Bluebreast darter
Gilt darter
Spoonhead sculpin
Deepwater sculpin
Tiger salamander
Bog turtle
Leatherneck sea turtle*
Hawksbill sea turtle*
Atlantic Ridley sea turtle*
Massasauga rattlesnake
Golden eagle
Bald eagle*
Peregrine falcon*
Eskimo curlew*
Piping plover*
Least tern
Roseate tern*
Loggerhead shrike
Indiana bat*
Sperm whale*
Sei whale*
Blue whale*
Finback whale*
Humpback whale*
Right whale*
Gray wolf*
Cougar*
Eastern woodrat

Threatened Species

Lake sturgeon
Mooneye
Lake chubsucker
Mud sunfish
Longear sunfish
Cricket frog
Mud turtle
Blanding's turtle
Loggerhead sea turtle**
Green sea turtle**
Timber rattlesnake
Osprey
Red-shouldered hawk
Northern harrier
Spruce grouse
Common tern

Species of Special Concern for New York State

Buckmoth
Silver chub
Gravel chub
Blackchin shiner
Black redhorse
Banded sunfish
Longhead darter
Southern leopard frog
Hellbender
Jefferson salamander
Blue-spotted salamander
Spotted salamander
Spotted turtle
Wood turtle
Diamondback terrapin
Worm snake
Eastern hognose snake
Common loon
Least bittern
Cooper's hawk
Black rail
Upland sandpiper
Black tern
Common barn owl
Short-eared owl
Common nighthawk
Common raven
Sedge wren
Eastern bluebird
Henslow's sparrow
Grasshopper sparrow
Vesper sparrow
Small-footed bat
New England cottontail
Harbor porpoise

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* Indicates that the species is currently listed as "endangered" by the U.S. Department of the Interior.

** Indicates that the species is currently listed as "threatened" by the U.S. Department of the Interior.

List compiled by the New York State Department of Environmental Conservation, 8/3/87

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Neighborhood Survey Activity (2-2) Record

Name: ______________________________ Date: ______________

Names of other members of your survey team:

Habitat surveyed (for example, city park, neighborhood street):

Fill in the table on the back of this sheet.

- Circle the food, water, and nesting site resources that you found.
- In what seasons are these resources available?
- What wildlife or wildlife sign did you observe? (**Note:** You may see "sign," or evidence, of animals, such as tracks or droppings, rather than the animals themselves.)

Resource	**Season(s) Available**	**Wildlife or Wildlife Sign Observed**
Food		
Grass, leaves, and twigs		
Fruits and berries *Can you name the plants they come from?*		
Seeds, nuts, and grains		
Flowers with nectar		
Small mammals (or their sign) and birds		
Insects		
Decaying plants and animals		
Garbage		
Other		
Water *(Note: Wildlife may also get water from the food they eat.)*		
Ponds		
Puddles		
Streams		
Bird baths		
Other		
Nesting Sites		
Cliffs or high buildings		
Cavities (holes in trees or buildings)		
Trees		
Shrubs		
Ground		
Burrows (holes in the ground)		
Ponds, streams		
Other		

Now answer these questions about the resources for wildlife in your neighborhood:

1. Based on the food resources you discovered in your neighborhood, what groups of wildlife would you expect to find? (For example, will there be herbivores, nectarivores, or carnivores?)

2. Did you see wildlife using the food resources in your neighborhood or notice signs of wildlife having used the resources? Explain.

3. Can wildlife find water in your neighborhood? If so, where?

4. Did you see wildlife drinking the water in your neighborhood or notice signs of wildlife having drunk the water? Explain.

5. Did you see wildlife using the nesting sites in your neighborhood or notice signs of wildlife having nested at the sites? Explain.

6. Based on the nesting sites present in your neighborhood, what groups of wildlife would you expect to live there? (For example, will there be cliff nesters, cavity nesters, or tree nesters?)

Wildlife Pests Activity (3-1) Record

Name: ______________________ Date: ____________

Name of species: ______________________

1. What does this species eat?

2. How does this species obtain water?

3. Where does this species build nests and raise its young?

4. Does your **home** provide the foods, sources of water, and nesting sites this species needs? Why or why not?

5. Does your **school** provide the foods, sources of water, and nesting sites this species needs? Why or why not?

6. What might you do to get rid of this species?

Habitat Diversity Activity (3-3) Record

Name: ______________________ Date: __________

1. Which habitat do you think would have the largest number of different species? Why?

2. Which habitat do you think would have the smallest number of different species? Why?

3. How might a diverse habitat differ from a habitat with little diversity?

4. What makes a habitat diverse?

Insect Diversity Activity (3-4) Record

Name: ______________________________ Date: ____________

Description of habitat:

Draw and name the insects you collected in your habitat. You can make up your own names or ask your teacher or leader for a field guide to help you identify the insects.

Field Journal Activity (3-5) Record

Name: ______________________________ Date: ______________

Names of other observers in your group:

Time:

Location of site:

Weather:

Description of site (including plants present):

Wildlife observed:

Activity:

Signs of wildlife:

Drawings:

Interview Activity (4-1) Record

Name: ______________________ Date: __________

Name of landowner: ______________________

Location of property: ______________________

Approximate size of property: ______________________

Sample questions to ask landowner(s). Record the answers.

1. What did the property look like before you started improvements?

2. What foods were available for wildlife? Where were the food sources located?

3. What water sources were available for wildlife? Where were the water sources located?

4. What nesting sites were on the property? Did these sites provide shelter from the elements and protection from predators? Where were they located?

5. What types and species of wildlife did you observe on the property before you began improvements?

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6. Why did you decide to improve a wildlife habitat?

7. What wildlife species are you trying to attract?

8. What food sources have you provided?

9. What water sources have you provided?

10. What nesting sites have you provided?

11. Have you noticed new species of wildlife since you began your improvements? If so, what species?

12. Have you seen wildlife feeding on your property?

13. Have you seen wildlife nesting on your property?

14. Do you have maps or plans of your property and (or) field journals that you could share with us?

15. Did you participate in a national or state program that assists landowners in improving wildlife habitats? If so, which one(s)?

16. How much time and money does it take to develop a wildlife improvement site?

17. What are your suggestions for people who are planning wildlife improvement projects?

Choosing a Habitat Patch Activity (4-2) Record

Name: ______________________ Date: __________

1. Where is the site you are considering for your habitat patch?

2. Is the site near areas where wildlife are present?

3. Why do you think this site needs improving to create a good wildlife habitat?

4. How will you get permission to improve the habitat on this site?

5. How will you maintain the value of the site for wildlife? Will it be convenient for you to maintain this site once you make the habitat improvements?

Assessing Your Resources Activity (4-3) Record

Name: ______________________________ Date: ____________

Name of habitat patch site: ______________________________

1. What food sources are present on the habitat patch site?

2. What nesting sites are present?

3. What wildlife or signs of wildlife have you observed?

4. Describe the soil drainage and soil nutrients.

5. How many hours a day does the site receive sunlight?

6. How much time do you have to develop and maintain the habitat patch site?

7. How much money do you have to develop and maintain the site?

8. Do you have any materials on hand that will help you develop the site?

9. Are there groups that can help you develop and maintain the habitat improvements?

Wildlife Needs Activity (4-4) Record

Name: ______________________________ Date: ____________

Species of wildlife: ______________________________

For each wildlife species you are considering, answer the following questions:

1. What does this species eat?

2. How does this species obtain water?

3. Where does this species nest?

4. Will you be able to supply and maintain the plants and other structures this species needs?

5. Are individuals of this species present in the area near your habitat patch?

Making the Improvements Activity (4-5) Record

Name: ______________________ Date: __________

For each plant to be added to your habitat patch, answer the following questions:

1. What is the name of the plant?

2. What wildlife does this plant attract?

3. How will you plant this plant?

4. How will you maintain this plant?

For each structure you plan to add, answer the following questions:

1. What structure are you adding?

2. What wildlife does this structure attract?

3. How will you build this structure?

4. How will you place this structure in your habitat patch?

5. How will you maintain this structure?

Maintenance Plan Activity (4-6) Record

Name: ______________________________ Date: ______________

1. How much time each week can you devote to your habitat patch?

2. How much money do you have for maintaining your habitat patch?

3. List the required maintenance tasks. For each task, include when it must be performed and who will do it.

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Local Wildlife Issues Activity (5-1) Record

Name: ______________________________ Date: ______________

1. What is the proposed development project?

2. Describe how the development project would affect wildlife. What wildlife would be affected? Are the wildlife that would be affected rare in the state? In your community?

3. What steps could the developers take to lessen the effect of their project on wildlife?

4. How might this controversy be resolved? Would the solution be satisfactory to all parties? Why or why not?

Wildlife in Today's Landscapes

Project Record

Name: ______________________________ Date: ______________

1. What are the basic needs of all wildlife?

2. List five groups, or guilds, of animals that use similar food resources. Give examples of animals in each.

3. List five groups, or guilds, of animals that use similar nesting sites. Give examples of animals in each.

4. Describe some of the differences between the following habitats and their associated wildlife: urban areas, suburbs, edge habitats, and large areas of intact forest.

5. What are some of the ways you can help rare and endangered wildlife?

6. What was the most important thing you learned from this project?

Table of Trees and Shrubs and the Wildlife They Attract

Trees and Shrubs	Crows/ Jays	Finches	Grosbeaks	Grouse/ Quail	Hawks/ Owls	Nut-hatches	Robins/ Thrushes	Sapsuckers/ Wood-peckers	Warblers	Water-fowl	Beavers	Chipmunks/ Squirrels	Foxes	Mice/ Voles	Muskrats	Rabbits/ Hares	Raccoons	Skunks	White-tailed Deer
CONIFERS																			
Eastern hemlock	C	F		C	C							F,C				C			F,C
Eastern red cedar		F	F	C			F	F	F			C				C			
Eastern white pine			F			F		F	F			F,C				F,C			C
Northern white cedar												C							F
Red pine			F			F		F	F			F,C				C			C
Spruce	C			C	C	F		F				F,C				F,C			C
Tamarack				C															
DECIDUOUS HARDWOODS																			
Apple	F	F		F			F	F				F	F	F		F	F		F
Ash		F	F	F				F		F	F								F
Aspen/Cottonwood/Poplar		F		F							F			F		F			F
Basswood/Linden												F				F			F
Beech	F		F	F				F		F		F							
Birch				F				F			F					F			F
Black cherry/Chokecherry	F		F	F			F	F				F	F			F	F		F
Dogwood		F	F	F			F	F	F			F				F			F
Elm		F	F					F		F		F							
Fire cherry/Pin cherry			F	F			F									F			
Black gum		F		F			F					F							
Hackberry			F				F	F					F						
Hickory			F					F		F		F							
Maple/Box elder		F	F	F		F		F			F	F		F		F			F
Mulberry	F			F			F	F				F					F		
Oak	F			F		F		F		F		F		F	F	F	F		F
Pear		F		F															
Russian olive			F				F												
Tulip poplar		F						F				F							
Walnut/Butternut												F							
Willow			F	F							F				F	F			F
Witch hazel			F									F							F

Key: F = Used for food
C = Used for cover, or protection from predators and weather

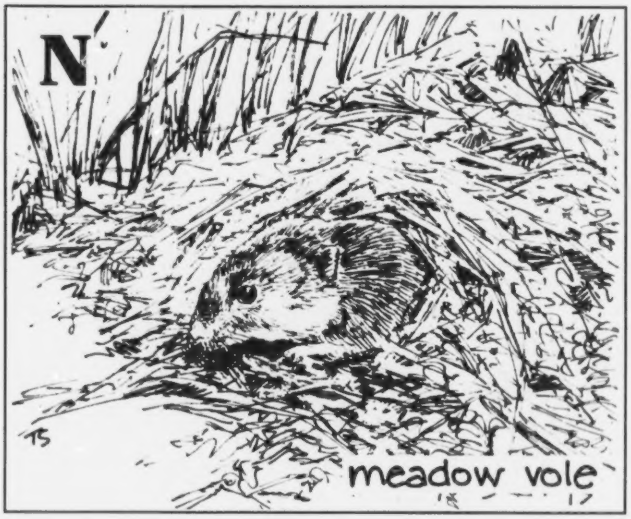
Trees and Shrubs	Crows/ Jays	Finches	Grosbeaks	Grouse/ Quail	Hawks/ Owls	Nut-hatches	Robins/ Thrushes	Sapsuckers/ Wood-peckers	Warblers	Water-fowl	Beavers	Chipmunks/ Squirrels	Foxes	Mice/ Voles	Muskrats	Rabbits/ Hares	Raccoons	Skunks	White-tailed Deer
SHRUBS/VINES																			
American bittersweet		F,C	F	F,C			F					F				F			F
American holly				C			F	F									F		
Blackberry/Raspberry	F		F	F,C			F					F	F			F,C	F		F
Blueberry	F			F,C			F					F	F			F,C		F	F
Currant																			F
Elderberry			F	F,C			F					F	F			F	F	F	F
Euonymus																F			
Grape	F			F,C			F,C	F				F,C	F				F,C	F	F
Huckleberry				F,C								F	F			F,C			
Partridge-berry				F								F	F				F	F	
Privet				C												C			
Rhododendron				C												C			F,C
Sassafrass				F							F					F			F
Sumac[1]				F			F					F		F		F			F
Virginia creeper							F	F											
Wild rose			F	F,C			F				F	F				F,C			F
Yew[2]	F			F			F					F				C			F

Key: F = Used for food
C = Used for cover, or protection from predators and weather

Compiled by Paul Curtis and Patricia Bricker

[1] Some species may cause skin irritation.
[2] The berries are very poisonous to humans.

Activity 2-1: Wildlife Guilds Activity Cards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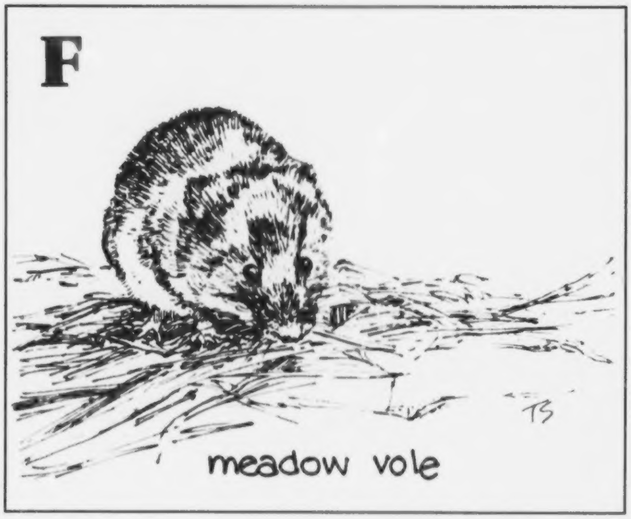
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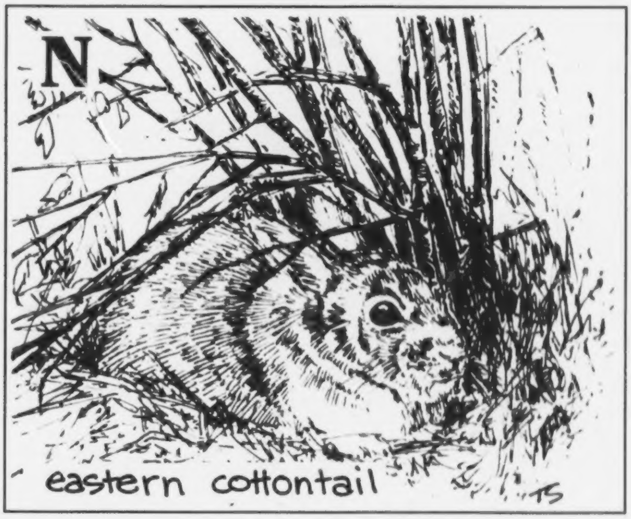
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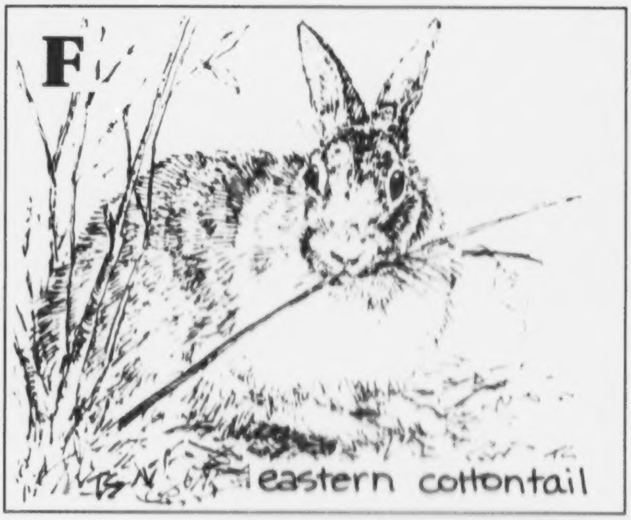
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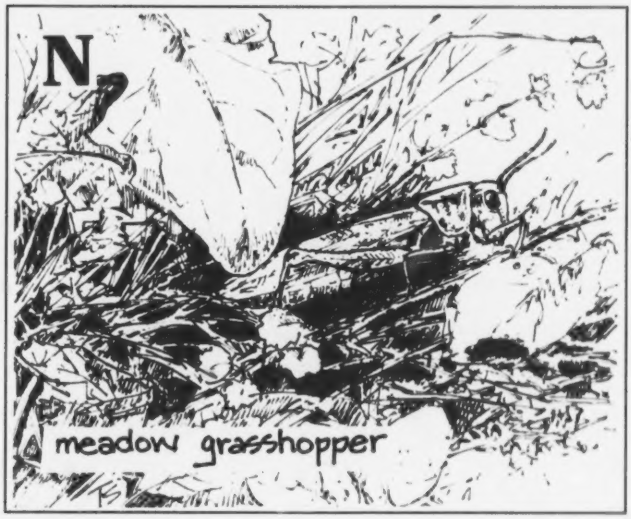
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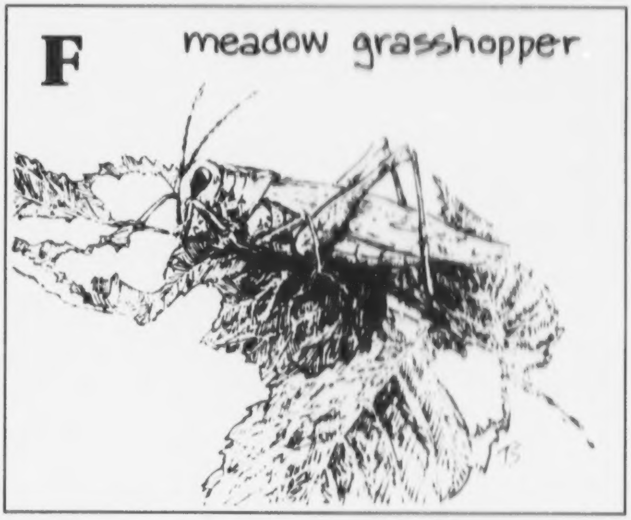
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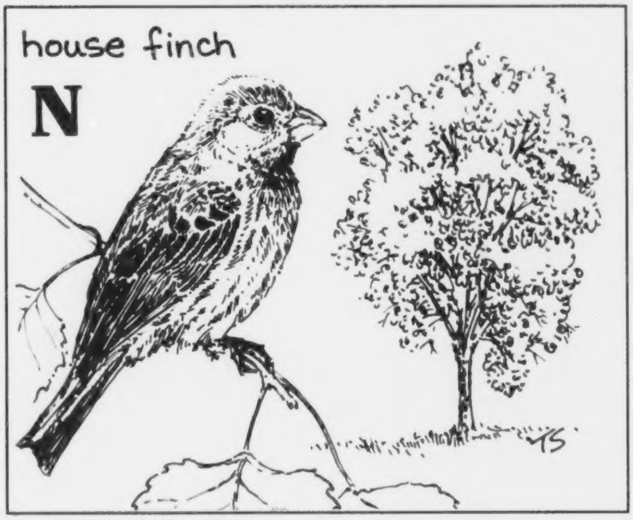
Activity 2-1: Wildlife Guilds Activity Cards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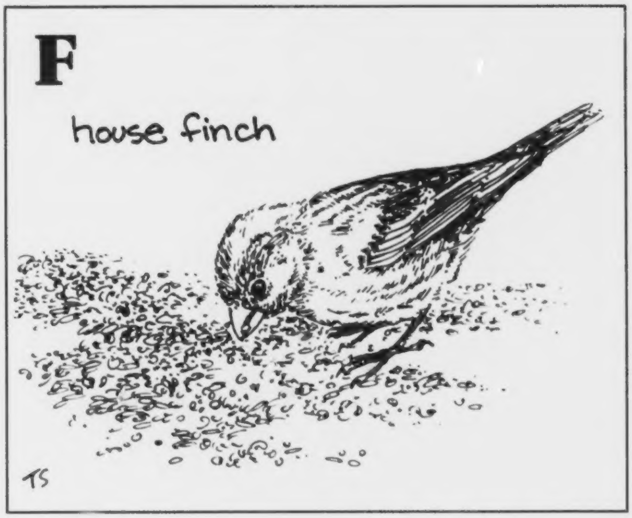
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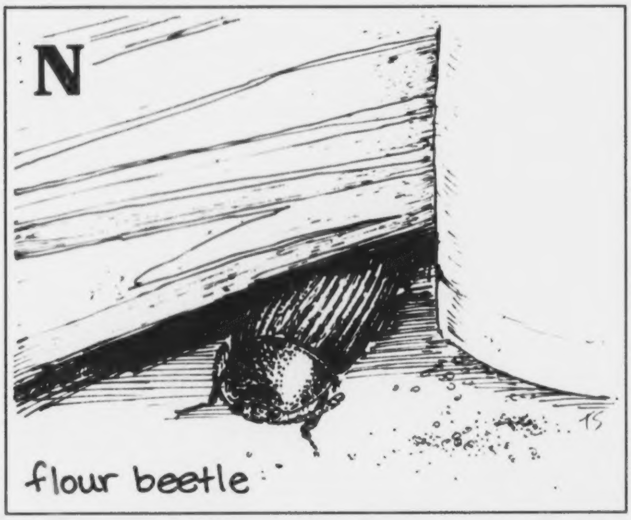
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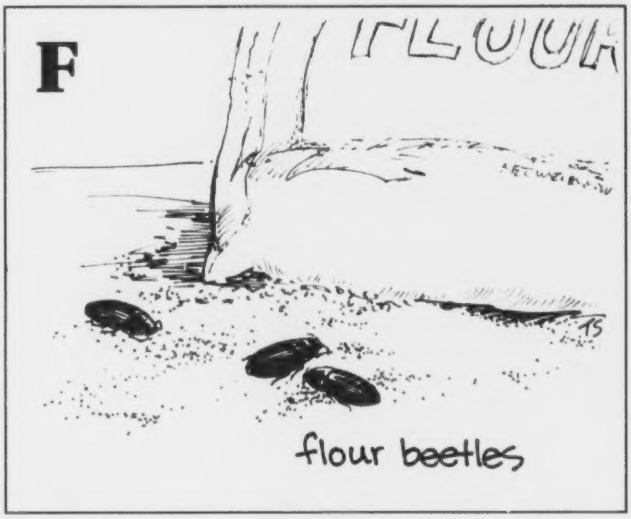
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FLOUR
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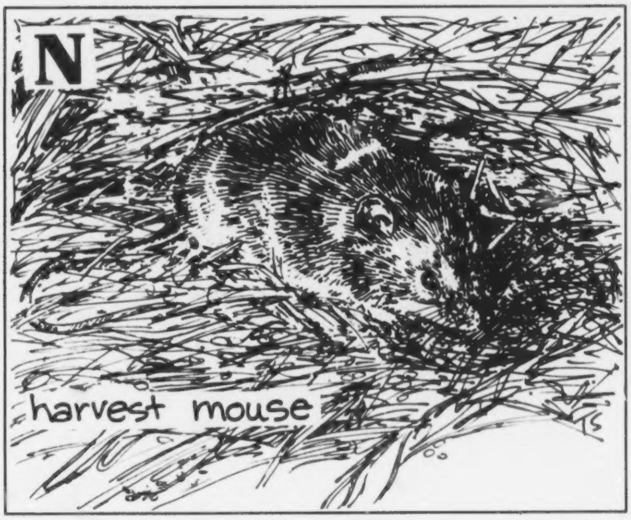
flour beetles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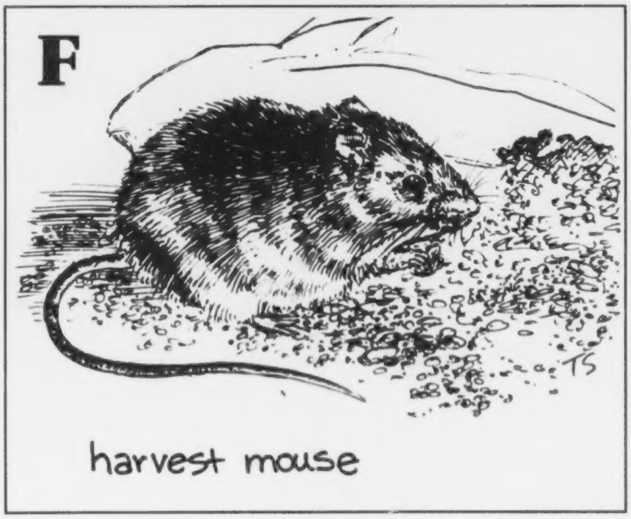
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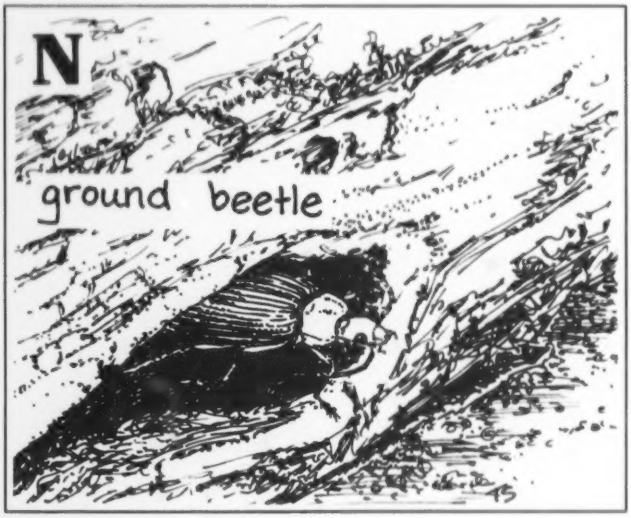
Activity 2-1: Wildlife Guilds Activity Cards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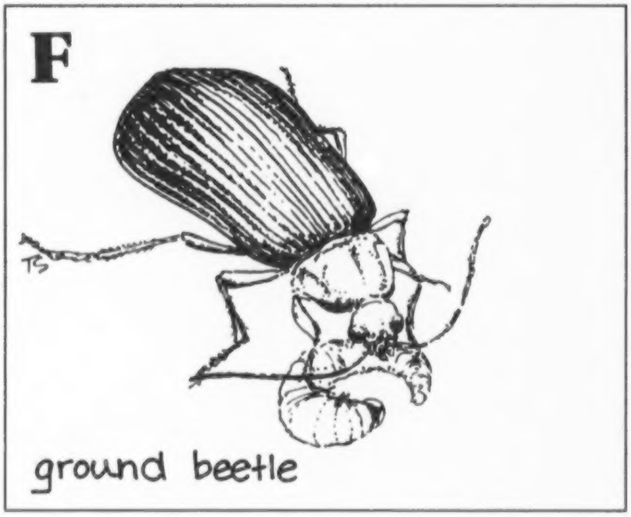
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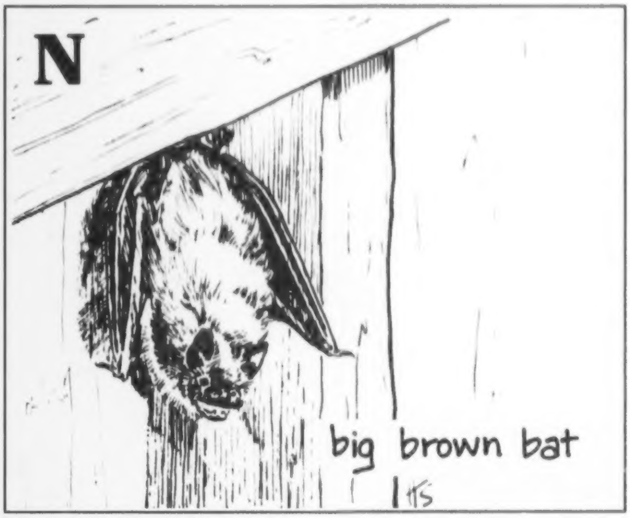
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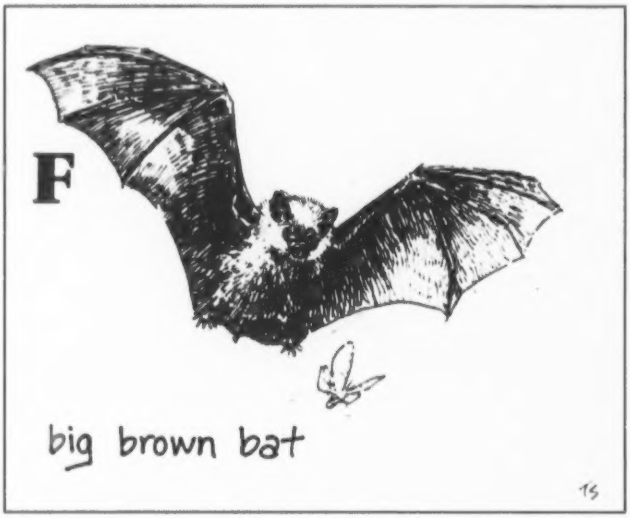
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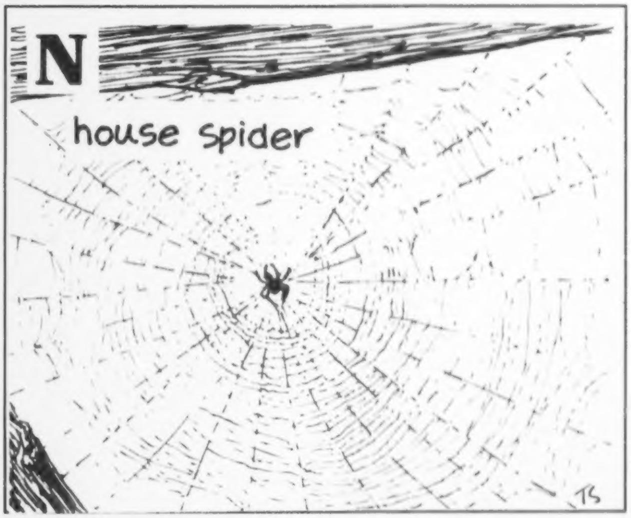
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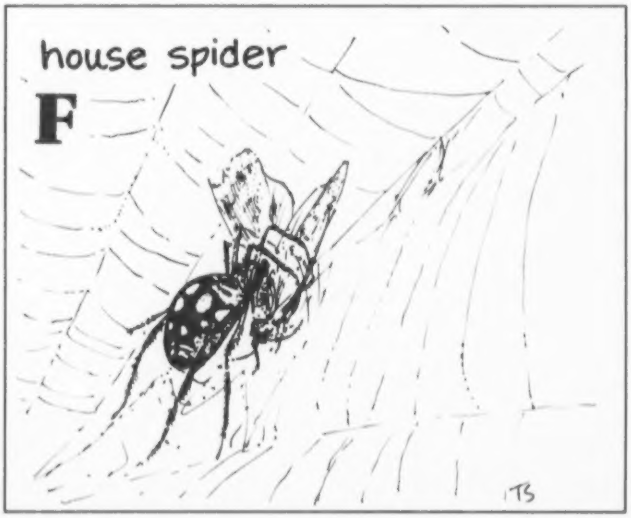
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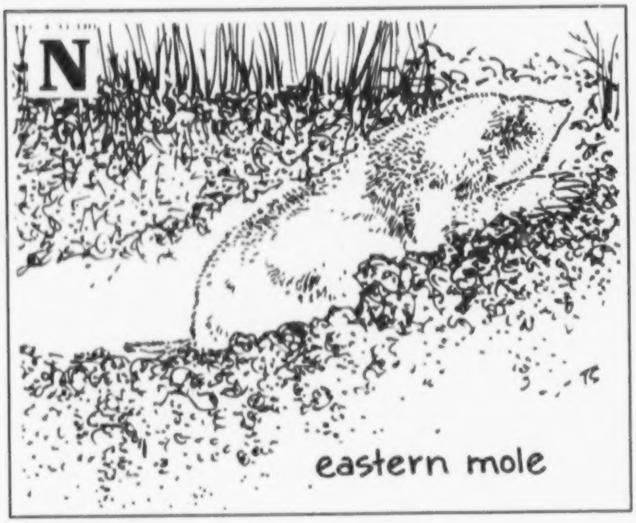
Activity 2-1: Wildlife Guilds Activity Cards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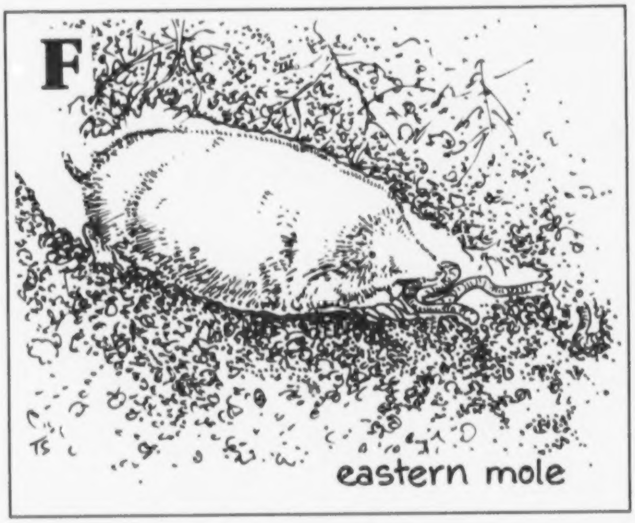
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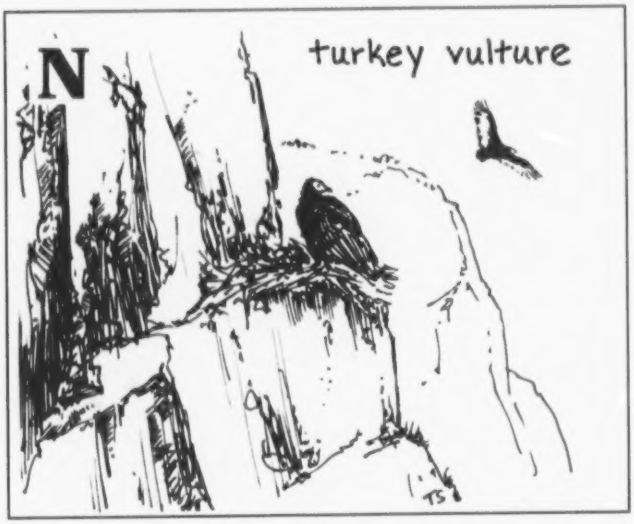
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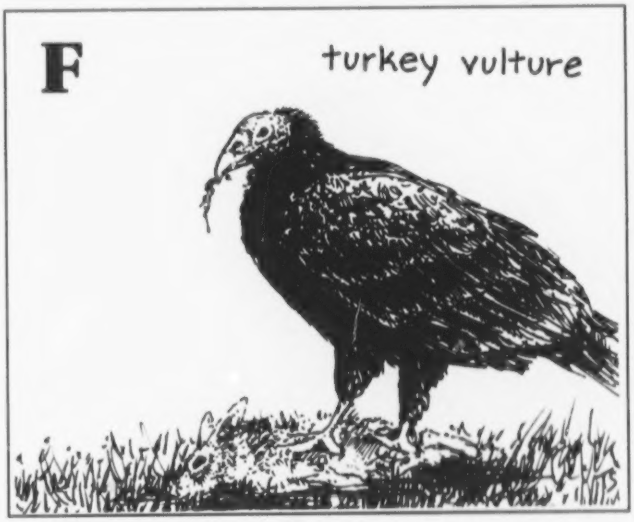
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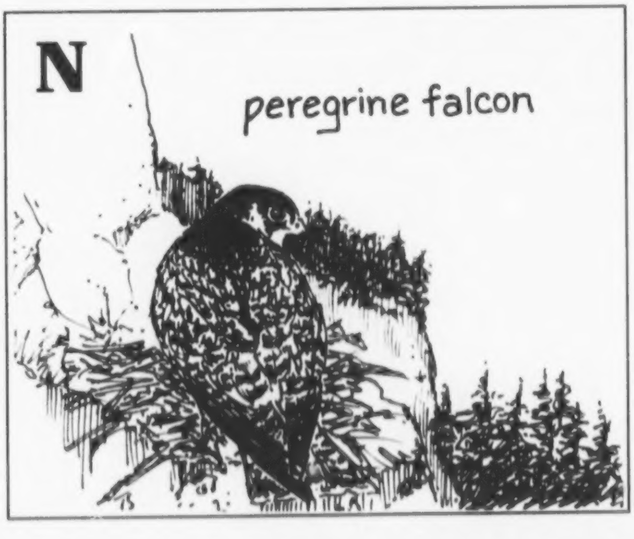
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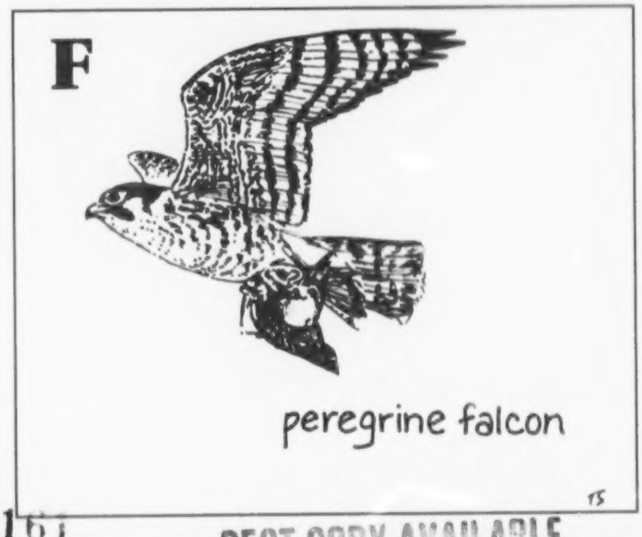
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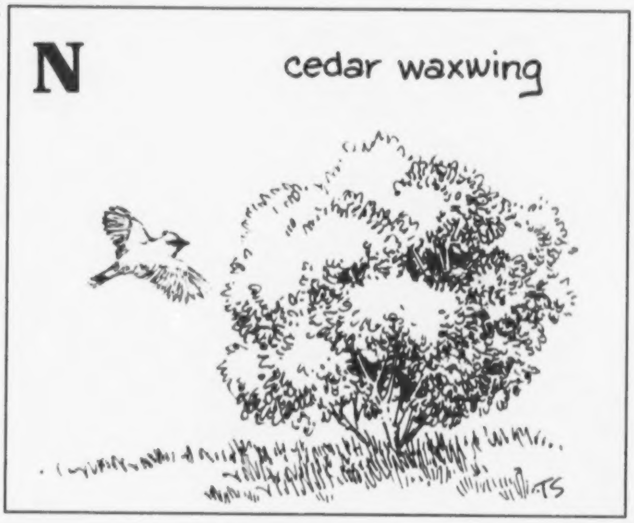
Activity 2-1: Wildlife Guilds Activity Cards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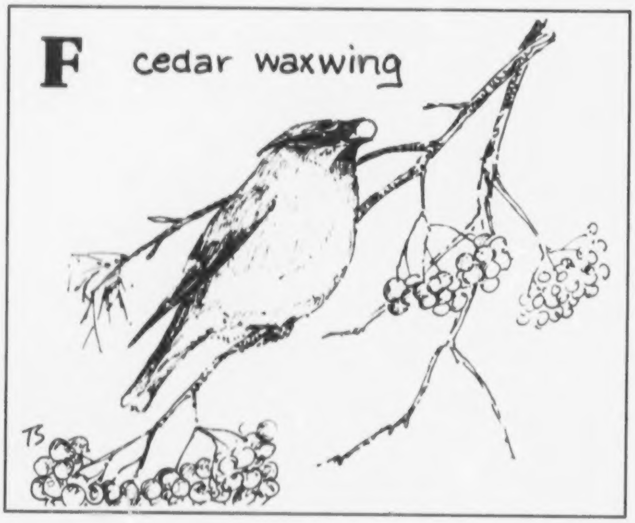
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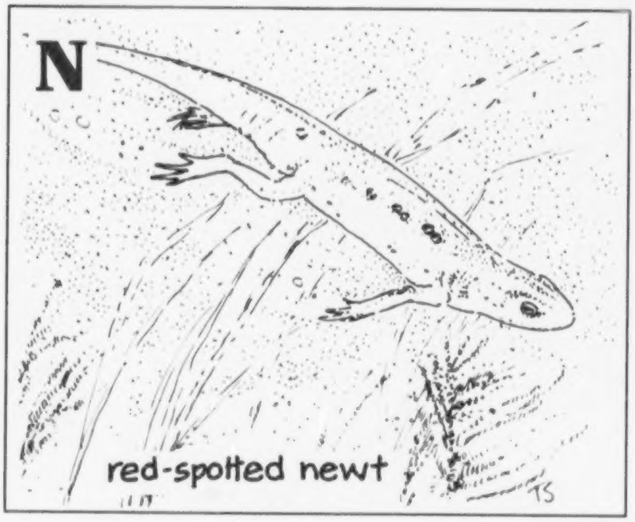
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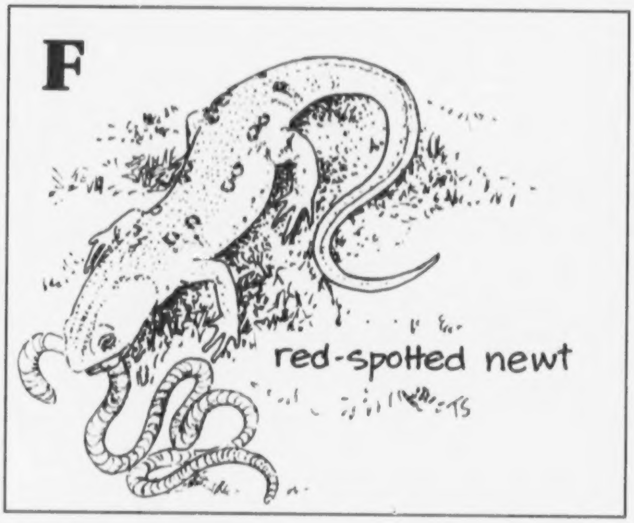
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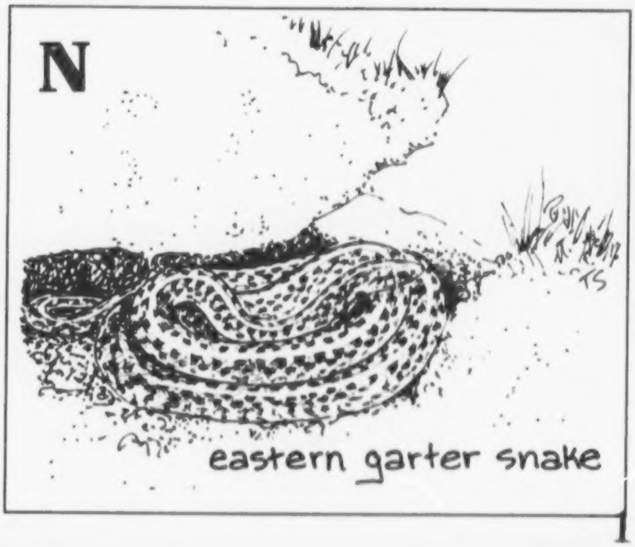
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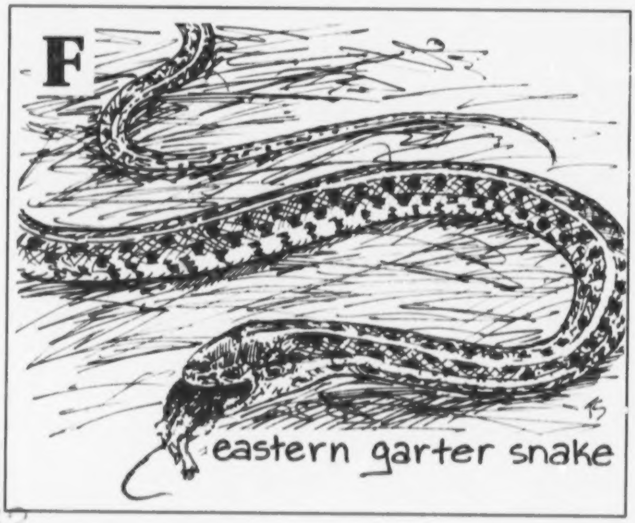
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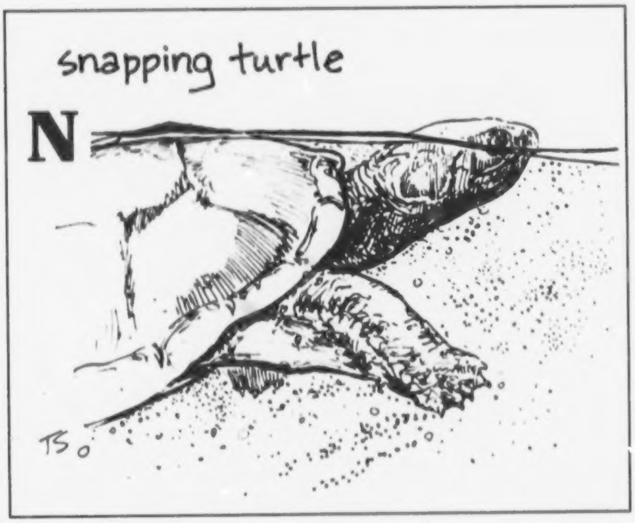
Activity 2-1: Wildlife Guilds Activity Cards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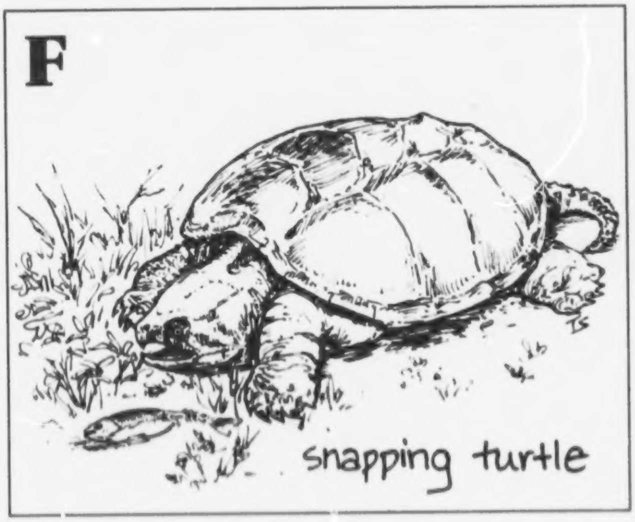
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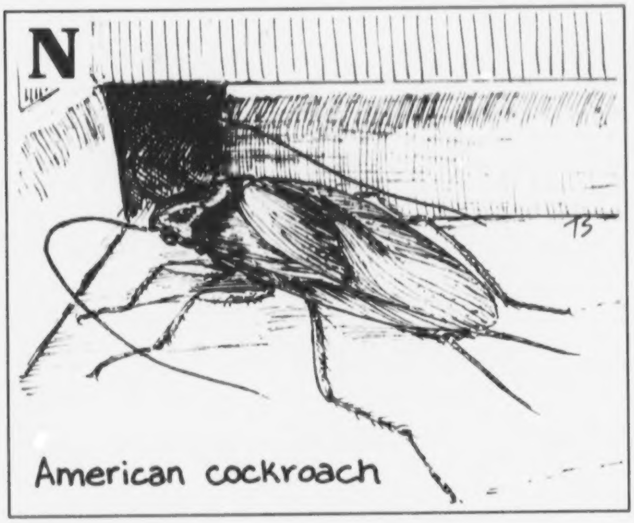
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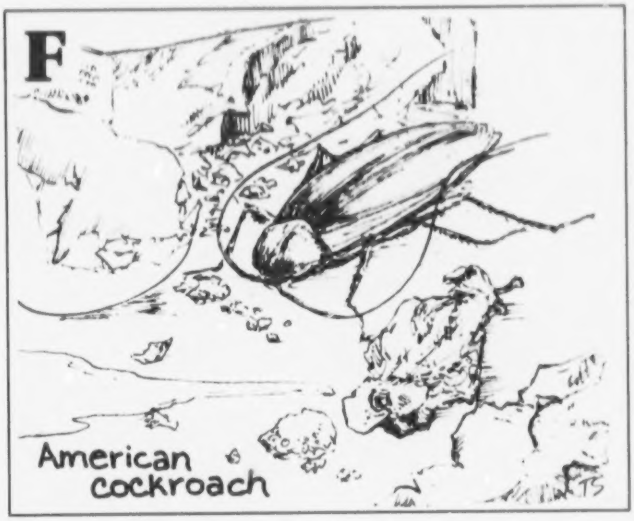
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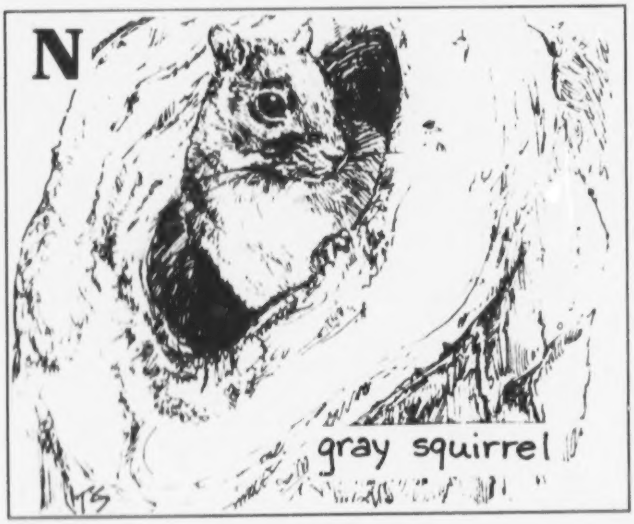
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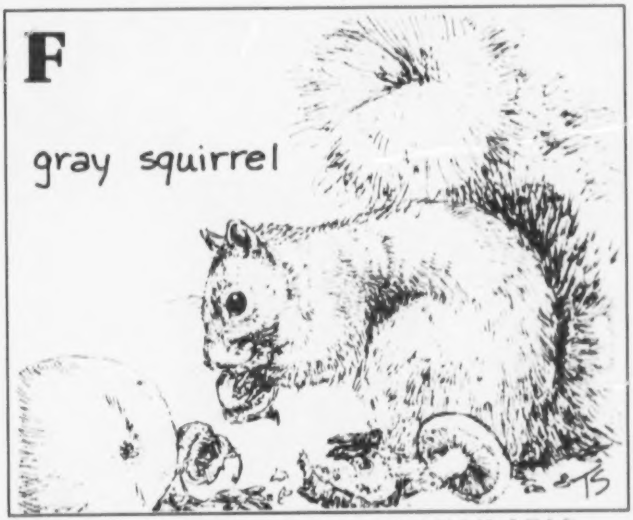
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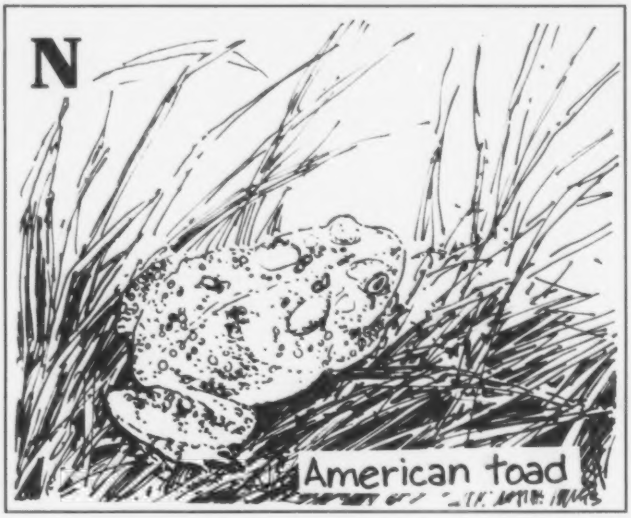
Activity 2-1: Wildlife Guilds Activity Cards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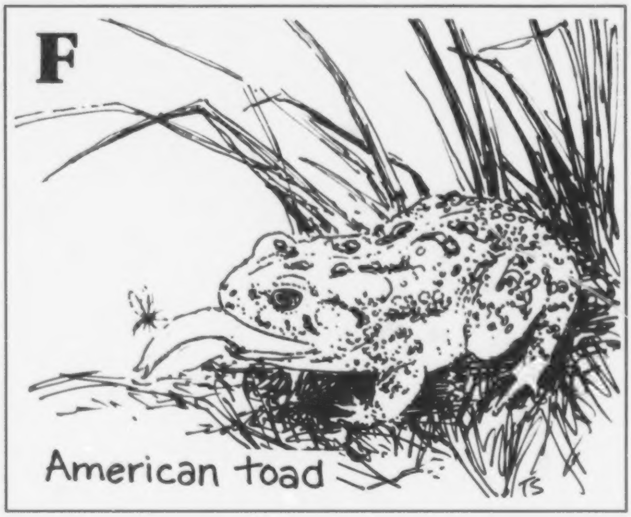
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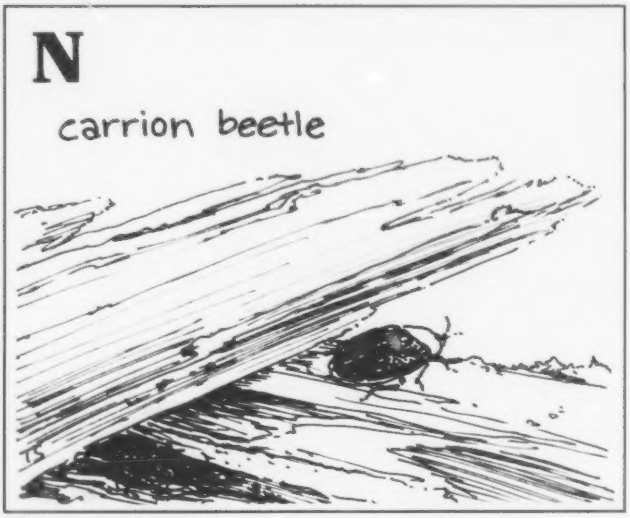
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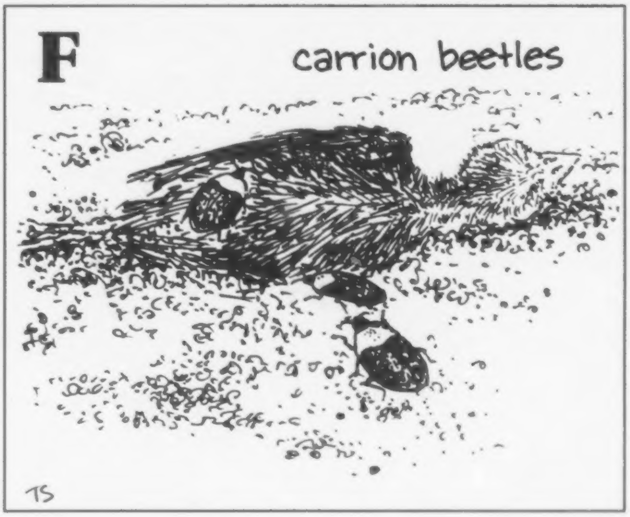
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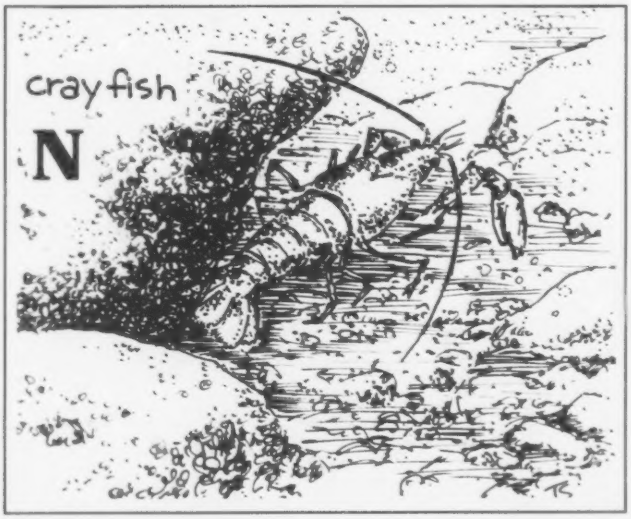
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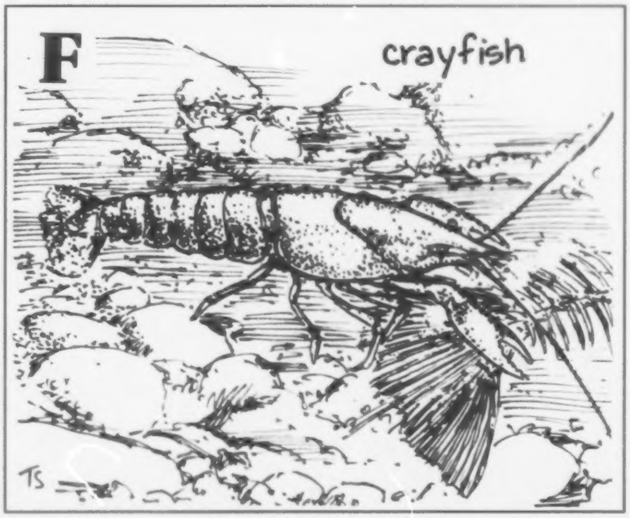
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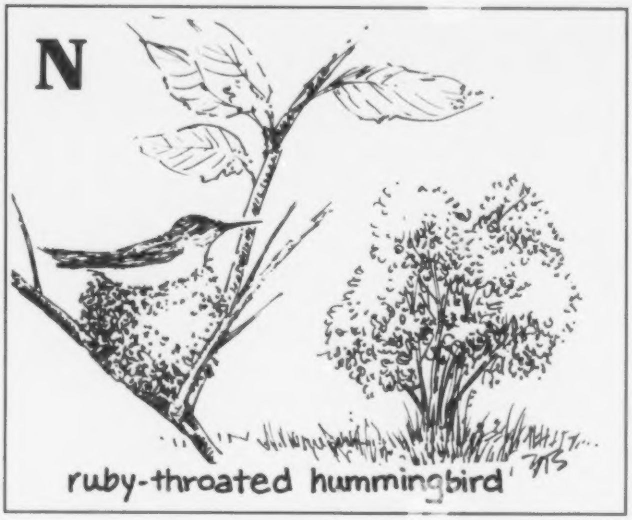
Activity 2-1: Wildlife Guilds Activity Cards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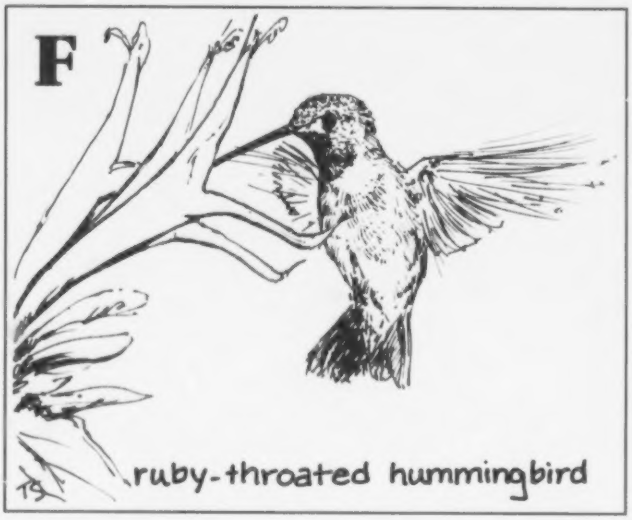
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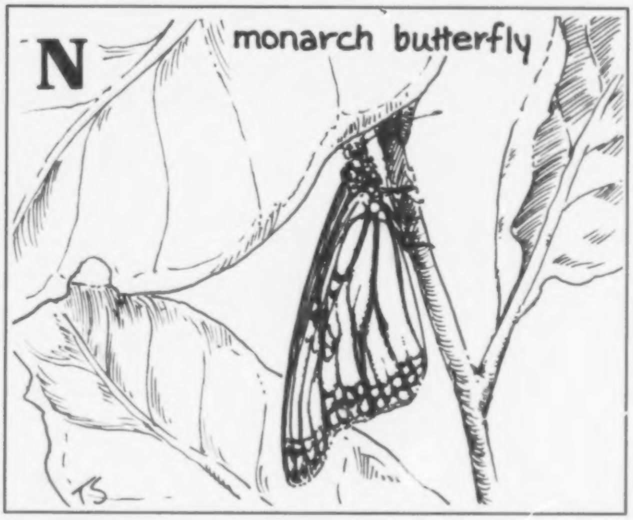
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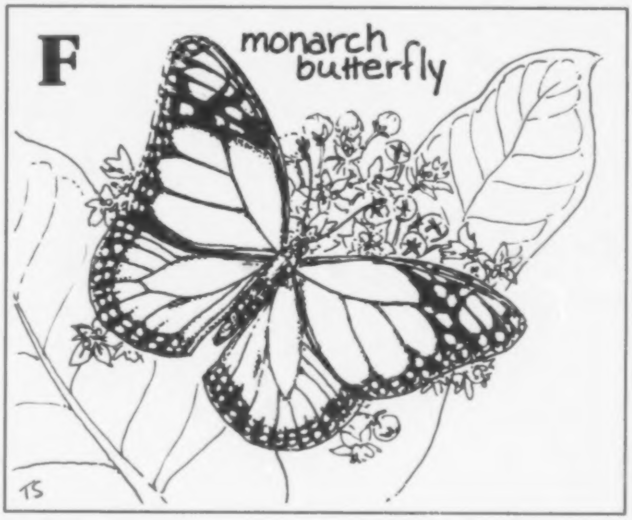
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